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MOSQUITO EXTERMINATION

New Jersey Appropriates $350,000 to Drain Breeding Areas—Public Health Endangered—Newark First to Act—Elizabeth Also in Line—Methods and Results

By JOHN B. SMITH, Sc.D.,
New Brunswick, N. J.

MOSQUITOES as nuisances have been known for many years; as dangers to public health their recognition is comparatively recent. Stretches of seashore and other localities otherwise desirable as places of residence have been rendered uninhabitable by the insects and property values reduced to nothing. So long as their annoying features only were recognized the pest was borne with such philosophy as could be mustered as something unavoidable, and the suggestion that it might be mitigated or entirely removed was ridiculed when first timidly put forth.

When it became known generally that there was another feature—that the insects were really dangerous to the public health and that not only malarial but pernicious fevers were transmitted by them, this attitude changed and those interested in sanitary matters began to consider whether or not matters might not after all be at least improved. And then it was found by the entomologists who looked into the subject that our knowledge of mosquitoes and their habits was of the scantiest and not altogether accurate.

The writer was one of the first of those who took up the systematic study of the life habits of the insects with the object of applying the knowledge practically, and the Legislature of the State of New Jersey was the first to provide for a systematic survey of the State to determine the feasibility of lessening the mosquito pest. Ten thousand dollars were provided for that purpose and expended under the writer's direction; afterward twenty thousand dollars were provided under a scheme for aiding individual communities. But this did not produce satisfactory results, and only a small part of the money was expended. At the last session a careful estimate was presented by me and it was shown that a total expenditure of $350,000 would be sufficient to clear the entire shore line of the mosquito breeding areas that were re-

SALT MARSH BREEDING AREA—NATURAL DRAINAGE CUT BY A ROAD

sponsible for over 90 per cent. of the mosquitoes in the State. The Legislature accepted the estimate and made the desired appropriation, which will, when available, inaugurate an absolutely unique campaign and form the most extensive piece of sanitary work attempted by an American State.

How do I expect to accomplish that almost inconceivable result, and what evidence have I that my schemes are practical? Briefly, to the first, my answer is, drainage and the utilization of natural enemies; to the second, the work already accomplished in New Jersey, on Staten Island and on Long Island.

Newark First to Act

The Board of Health of the city of Newark was the first to act officially in an attempt to improve a large city, and it made a small appropriation to which I added some of the State fund for the purpose of clearing up a salt marsh area from which millions of mosquitoes were produced annually to worry the citizens. The work was done by means of narrow, deep ditches which lowered the surface water level by nearly twelve inches and eliminated the shallow pools in which the wrigglers bred. It was all absurdly simple and the result was so obvious that the committee of the Board at once accepted it. But there were 3,500 acres of such marsh land within the city limits; could the same result be obtained over all this, at a cost possible to the city? My estimate was $5,000, which the Board considered incredible, but procured from the City Council. A contractor was found to accept the task and it was accomplished. The entire area was drained and, except in one corner where a broken sewer produces a local flooding, there is no breeding place left on the marshes.

On the Shrewsbury River the residents took hold of the matter and raised the amount necessary to do the work which was laid out for them by one of my assistants. The result was that for the two years now past the settlements on both sides of the river have been practically mosquito-free, property has advanced enormously in value, and the marshes produce a revenue from the salt hay, which can be cut by machine, where formerly it was scarcely possible to get on the meadow without top boots nor to remove the crop until frost.

The Salt Marsh Area

Most of the salt marsh area along the Jersey coast is quite level, consists of from 6 to 24 inches of turf and has a bottom of clayey mud or clay. The turf layer is like a huge sponge and the water will run out of it if given only half a chance. Therefore we dig a ditch at least thirty inches deep and as narrow as possible consistent with necessary capacity. A ditch of that kind starts no vegetation from the bottom and remains open indefinitely, even if the grass overhangs or closes it above, acting as a real drain. Killifish run up from the creeks and dispose of any larvæ that may get into the ditches. If we have a large depressed area we simply drain to a deepened center and connect with tide water so as to allow fish to run in. Land improvement is not our first aim; only mosquito drainage. Such improvement as comes is incidental and is usually sufficient to make the owner sit up and take notice.

The work just completed under the direction of Dr. Alvah H. Doty on Staten Island is another bit of evidence, where for $17,000 over fifteen square miles of marsh land is changed from a mosquito hatchery to productive salt meadow.

I have devoted so much time to the salt marsh feature because in New Jersey the offensive species are bred there and migrate inland. It used to be believed that mosquitoes would not breed in salt water; but some species breed only in salt water or on salt marshes, and these violate another supposed mosquito habit in that they do not remain close to their breeding places but fly inland for miles. I have traced mosquitoes bred on Staten Island, N. Y., to the second range of the Orange mountains, in New Jersey.

But we have not neglected the fresh water species by any means, and the first step was to secure an amendment to the general health law, making water in which mosquito larvæ breed a nuisance to be dealt with by the boards of health and abated exactly as any other nuisances are. This gives ample power to all local bodies to get after stagnant pools, swampy lots or other sources of house mosquitoes or species of Anopheles. It adds to the duties of health inspectors and other sanitary officers; but it adds nothing to the cost of administration.

I have cited the city of Newark as the first to take up mosquito work on a large scale; the city of Elizabeth was

HAND-DUG DITCH ON SALT MARSH
(Machine Ditches are run into Main Ditch Shown)

ahead of it, however, in an effort to rid itself of local breeding places before the importance of marsh work was realized, and in both cities the sewer catch basins are looked after throughout the summer. Under some conditions these catch basins breed great numbers of house mosquitoes, and here oil, periodically applied, is resorted to.

Importance of Drainage

When larger bodies of water or swampy areas come under consideration each must be dealt with according to conditions as they exist. Sometimes complete drainage is practical and sometimes it is not; but drainage or filling is always the first resort because it removes all chance of development. Sometimes a low, swampy area can be changed into a permanent pond by deepening the center and draining to it. This pond or pool may then be stocked with any except mud-fish and these will keep all wrigglers in subjection—an open pond or pool is never as dangerous as a series of puddles.

There are a few points that should be always kept in mind.

Mosquitoes breed only in water; but not all water breeds mosquitoes.

Mosquitoes are found in grass and in any dense vegetation; but they go there for shelter only, during the day, and the larvæ or wrigglers are never found there.

The cleaner the water the less danger of mosquito larvæ; but no water is so dirty that the larvæ will not breed in it; even absolute sewage will answer. So there is no body of water that wrigglers may not be found in—a tumbler or even a tea-cup will maintain a hundred—but a large, open, wind-swept body of water is usually safe, even if not inhabited by fish.

Fish and mosquito larvæ cannot co-exist in one body of water, unless the water is so choked up with vegetation that the fish cannot move about freely.

Pools covered with duckweed or filled with Spirogyra almost never have mosquito larvæ, and a pool covered with "green scum," while it may be unsightly and offensive, is not dangerous as a breeding place.

Dense swamps or thick cat-tail areas produce no mosquitoes; contrary to the general belief, the Hackensack meadows where covered by cat-tails are not breeders of the pest.

In any case the first thing to be done in starting mosquito work is to determine just what species is in fault; there are over 100 species now, differing greatly in habit. Next find out just where the insects breed and then use common sense in dealing with the conditions as they exist. Oiling is always a temporary expedient or makeshift. It is effective, but will have to be done over again as soon as the oil disappears; the object should be to remove the breeding place in all cases.

Finally, it should be said that the best results will never be obtained until every householder is educated to look after his or her own property so carefully that no mosquito larvæ can find an opportunity to develop on it. That time is coming and every person interested in municipal improvement can help it along.

THE SUPPRESSION OF DUST

Methods of Using Various Products—Water Sprinkling, Oiling with Crude Petroleum—Use of Soluble Salts and Tarring—Results

By Dr. GUGLIELMINETTI, Secretary of the French League for the Suppression of Dust, Paris.

I propose to examine the methods of dust suppression under the following heads, viz.: water sprinkling, oiling with crude petroleum, use of soluble salts and tarring.

Water Sprinkling.—This is the simplest method, but it is not the most practical nor the cheapest. It can only be applied superficially to the road, and does not reach the interior of the road material. The operation of sprinkling must be repeated continually during periods of drought, and requires a considerable force and proper equipment. This expense is doubtless permissible in towns of larger size, but the case is different in the smaller towns and villages, where the budget only suffices for the most urgent needs.

Oiling with Crude Petroleum.—The trials made at different times, notably in 1905, in the Auvergne district, have been far from satisfactory. The dust raised by rapidly moving vehicles is irritating to the skin, and causes a disagreeable inflammation of the eyelids. Mr. Armandy, who made the application of his product "Pulveranto" to the roads of their district, attributes the trouble to the alkaline salts used to make the oil soluble in water.

Mr. Preaubert, of Nantes, the inventor of "Rapidite," has explained the method of using this product (asphalt emulsified and soluble in water). "Rapidite" is employed by dissolving in the water used for sprinkling the road, after it has been rolled. A 5 per cent. or 10 per cent. solution is made, and about twenty liters used per square meter of superficial surface, and makes a sort of mortar which hardens in time like cement. About one kilo of rapidite is needed per square meter and at a cost of 250 francs per 1,000 kilos, the price demanded, a road six meters wide would cost 1.5 francs per meter for treatment. It is unfortunately not stated whether the use of rapidite affords the elasticity of surface suitable for the feet of horses. Mr. Forestier, Overseer of the Bois de Boulogne, has made many applications of petroleum oil, soluble in water. According to him, it penetrates the road surface easily, and appreciably hardens it. It seems, nevertheless, that some reservation should be made as to the efficacy of the oil, as the roads of the Bois de Boulogne do not in general sustain heavy traffic.

Use of Soluble Salts.—There have been no particularly encouraging results in this direction, the main difficulty being in obtaining a constant strength of solution; this being apparently impossible to maintain except by constantly agitating the liquid in the distributing vessel, which is quite a material obstacle.

Tarring.—Finally, taking up the question of tar, it would seem to have the advantages of being easily used

and of being obtainable wherever there is a gas works.

I will not attempt to take up in detail the very complete report of Mr. Heude, who as Chief Engineer of Bridges and Highways has been in charge of numerous applications of tar in the Siene and Marine Department during the last three years.

The following are the main points:

Tar is best applied hot and at a temperature near that of boiling.

The results have been invariably excellent, and fully justify the expense involved.

The application of tar requires a certain precaution and a certain manual skill that, however, is easily learned by experience. It should not, for example, be applied to a newly-made road, which is dry and covered with dust or fine loose material, without this being removed to expose the solid pavement beneath.

One point alone remains obscure. Is it desirable to incorporate the tar with the material while making a new road? Mr. Heude, on the basis of his own experience, replies categorically, yes. Tarring protects the road, and consequently prolongs its life.

It is the same on roads sustaining heavy traffic, for instance, the road from Paris to Fontainbleu. By three successive tarrings in 1903, 1904 and 1905 an economy in repairs of .05 francs per square meter was made over the former cost, the tar application having increased by four or five years the usual period for relaying.

M. Girardeau, road commissioner for the Arrondissment of Fontainbleu-le-Comte (Vendee) arrived at a still more favorable figure; he estimated that the tarring resulted in an annual economy of practically 25 per cent

It is certain that this consideration, without reference to others, will favorably influence the decision of the Ministers of Public Works and of the Interior who supervise the roads of France. But if the practice of tarring becomes general, it may be asked how the gas works of France, which produce but 100,000 tons per year, will supply the tar. Their output, it is certain, will not suffice, but the by-product coke ovens are able to produce also 200,000 tons, although the yield is lower, which will give in all 300,000 tons, sufficient to cover 30,000 kilometers of road.

The tar can be applied either by hand or by mechanical means. It goes without saying that, while the hand application is more thorough, in the end it is much cheaper to do the work by the aid of special machinery. The cost of the necessary apparatus is a tax which there should be no hesitation in imposing on the administration, as it is sure to prove a profitable investment. It may be obtained in any locality, and many industrial establishments already possess sufficient equipment to justify them in taking contracts for the tarring of roads.

The Lassailly works, among others, in operation on the avenue Wagram, in Paris, is able with a complete equipment to tar 10,000 square meters of road per day. As may be seen, matters have materially progressed since the modest attempts of 1902.

WASHINGTON'S STREET CLEANING

Two Systems Under District Supervision—Extent and Nature of Work—Equipment and Average Cost Per Mile—Sprinkling

Two systems are in vogue in the Street Department at Washington, D. C. Part of the work is done by the District itself and part by contract under District supervision. The area covered by each is about equal in extent and cost.

Hand Sweeping.—The city employs 115 men with hand brooms and 75 with hand sweeping machines, which are on the carpet sweeper order, manufactured by the Sanitary Street Sweeper Company, of Baltimore, Md., and the Wirt & Knox Manufacturing Co., of Philadelphia, Pa. Each man handling one of these sweepers is required to sweep 10,000 square yards of pavement, going continually over the area during the day and depositing the sweepings at stated distances along the curb. To every two sweepers there is a bag carrier, equipped with a pick-up machine, gathering the sweepings in bags. This device is a two-wheeled vehicle, holding a bag upright and fitted with a scraper attached to the handle resting on the ground, and when filled inverted into the sack. The sacks when filled are collected by the ten wagons owned by the department and hauled to the public dumps, of which there are eight.

Each sweeper is also provided with a sprinkling pot holding 5 gallons, with which he is required to sprinkle the area before sweeping. The force is divided into six districts of about equal extent, with thirty-five men in each. Every district is in charge of an inspector provided with a bicycle, whose duty it is to see the work properly done and make a daily report of men employed, area covered, number of loads of sweepings removed, etc. Eight hours' work constitutes a day, for which the men receive $1.50.

Equipment.—The Department is equipped with 22 horses, 12 wagons, 150 pick-up sweeping machines, 100 bag carriers, 200 snow scrapers, 500 shovels and 100 sprinkling cans; also 12 street sprinkling wagons about equally divided between the Austin and Studebaker type. Eight additional sprinklers have recently been added.

Average Cost Per Mile

The average cost per mile of a 39-foot roadway for hand sweeping during the year was $1,250. The total area cleaned, as reported for 1905, was 430,216,853 square yards, at a cost of 18 3-5 cents per square yard; sweepings removed, 34,312 cubic yards, and total cost, $80,108.24.

The present contract price is 16 13-16 cts. per square yard for machine sweeping, but the new contract soon to take effect is for 22¾ cts. per square yard, the increase being due to a change in specifications and character of work required. The work is in charge of three inspectors of the Street Cleaning Department, and the force employed by the contractor consists of 3 sprinklers, 12 horsepower sweeping machines, 12 carts, 18 laborers and one

THE PEERLESS HAND STREET SWEEPER

dump man. The force is divided into three gangs, each taking a section of the route scheduled for cleaning, said schedule being prepared by the Street Department. The streets are first sprinkled, then swept by machines and the sweepings gathered into piles at the curb by broom men. The wagons follow, collecting the sweepings. Unimproved streets are cleaned by contract for the price of $64 per day, the contractor furnishing 32 men, 10 horses and carts with drivers and all necessary tools. The force is divided into four gangs, each in charge of a Street Cleaning Inspector. Three cover the unimproved streets in the northwest, northeast, southeast and southwest sections, respectively, and the fourth cleans around the market and adjacent business streets. The laborers are provided with hand brooms and scrapers with which they scrape and sweep roadway and gutters, removing refuse, grass, weeds, etc., which are hauled to the dumps.

Alleys.—The contractor furnishes for the work of cleaning alleys three gangs and all necessary tools. Each is placed in charge of an inspector, and is cleaned once every week by hand brooms. The following figures show the cost of street sweeping, as given in recent reports: Cost, machine sweeping, area cleaned, 1905, 323,337,975 square yards; cubic yards removed, 61,953; cost, $54,361.18.

Alleys. — Area cleaned, 33,232,209 square yards; cubic yards removed, 14,260; cost, $11,631.30. Unimproved streets—Area cleaned, 22,681,544 square yards; cubic yards removed, 18,344; cost, $15,892.99.

There is a recommendation that this contract work be abolished and the entire street cleaning be done by the Department, as it is urged by the superindendent that simpler, better and cheaper results could be obtained.

Whether or not this recommendation will be carried out is problematical, but it is known that the present Board of District Commissioners has been giving much attention to the whole subject. Unlike most cities, the national capital is not handicapped by the entrance of politics into the management of its municipal affairs, and the city has been the gainer by it, not only in handling of street cleaning work, but in all other departments of the Government. The Board of Commissioners, as is generally known, consists of three members, one of whom is a Republican, a second a Democrat and the third must be an engineer officer of the United States Army. The Civil members have each served four or five years, while the Engineer Commissioner has been on the detail for several years and is familiar with the system. In all departments the Civil Service rules prevail, and even in cases where a vacancy occurs at the head of a department, or in one of the principal offices, the promotion of subordinate officials is in order, unless for some good and sufficient reason.

PEERLESS STREET SWEEPER—SHOWING OPERATION

CITIES AND SANITATION

Duty of Municipalities to Promote General Health—Statistics of Census Bureau—Typhoid and Death Rate—Comparative Table Showing Local Conditions—Population and Geographical Location

AMONG the duties to its citizens devolving upon a municipality, probably no others are so important as those various services which aim to protect and promote the general health. The furnishing of safe water is a most important part of this duty, and success in this may be approximately measured by the typhoid death rate. Municipal action cannot entirely stamp out this disease, however, for a few cases are being continually imported from suburban districts (especially about this time of year, when vacationists are returning), and only State control can be effective there. But as a general statement it holds true that a low typhoid death rate means safe water, and a high rate results from polluted water.

The table presented below has been compiled from the latest published reports of the Census Bureau, and gives the means of the various municipal rates classified according to both population and geographical location.

The ten cities of the country among those reporting which had the lowest rates were as follows: Fitchburg, Mass. (2.9); Woonsocket, R. I. (3.3); Everett, Mass. (7.1); Quincy, Mass. (7.7); St. Joseph, Mo. (8.2); Newton, Mass. (8.3); Cambridge, Mass. (10.2); Holyoke, Mass. (10.3); St. Paul, Minn. (11.0); Saginaw, Mich. (11.0). The ten having the highest rates were: Pueblo, Col. (184.7); Youngstown, O. (180); Pittsburg, Pa. (136.5); Newcastle, Pa. (122.7); Cleveland, O. (115.0); Harrisburg, Pa. (103.9); Allegheny, Pa. (102.8); Wheeling, W. Va. (97.0); Wilmington, Del. (94.7); Spokane, Wash. (88.2).

That the typhoid rate is but little controlled by the general sanitary conditions appears from an inspection of the list of ten cities having the lowest death rate from all causes, which is as follows: St. Joseph, Mo. (apparently the healthiest city in the country); Omaha, Neb.; Lincoln, Neb.; St. Paul, Minn.; Tacoma, Wash.; Superior, Wis.; Everett, Mass.; Brockton, Mass.; Canton, O.; Minneapolis, Minn. But three of the first list appear in the second; and if we compare the lists of those having the highest typhoid rates and the ten having the highest total death rate, we find but one of the former in the latter.

MEAN DEATH RATES PER 100,000 POPULATION FROM TYPHOID FEVER

CITIES HAVING POPULATIONS OF	New England	North Atlantic	South Atlantic and Gulf	VALLEY OF THE MISSISSIPPI AND ITS TRIBUTARIES		Rocky Mts. and Western	Whole U. S.
				Northern	Southern		
More than 1,000,000	....	45.0	....	32.1	....	....	40.7
From 500,000 to 1,000,000	20.0	....	35.0	....	52.4	....	35.8
From 300,000 to 500,000	.....	84.9	40.9	48.5	....	25.0	53.7
From 100,000 to 300,000	24.4	30.0	48.8	31.1	47.4	54.9	34.7
From 50,000 to 100,000	23.6	38.9	63.2	40.2	69.7	38.7	39.3
From 25,000 to 50,000	18.0	41.2	70.5	40.8	36.9	95.7	39.1
All cities	20.8	40.9	61.6	39.6	46.9	61.1	42.1

THE HASSAM PAVEMENT

PATENTS have been granted in the United States, Canada, England, France, Germany, Belgium and other European countries to Mr. Walter E. Hassam, formerly Street Commissioner of Worcester, Mass., for a new form of pavement and for a new method of laying foundations for all kinds of pavements.

The method of laying the Hassam pavement is substantially as follows: The street is excavated to a depth of six or eight inches, depending upon the loads to be carried. The bottom of the excavation is finished parallel to the proposed top grade and rolled hard to a uniform surface upon which is put a layer of broken stone that will pass through a 2½-inch ring and stay in a 1-inch mesh. This layer is rolled till the spaces are nearly eliminated. A thin grout of Portland cement poured over the stones fills all the voids and is followed by a thick grout of cream consistency. Upon this foundation, before the grout is dry, a 2-inch wearing surface of Chestnut trap rock is placed and rolled so firmly as to unite it with the foundation and imbed the whole mass together. A thin Portland cement and sand grout are poured over this surface and rolled till all the interstices are filled and the surface comes true to the required grade. A thin layer of Portland cement, fine sand and half-inch pea stone is brushed into the small voids on the surface and the result is a street that presents a grip for horses and motor vehicles.

The above process results in a concrete monolithic pavement, since all the operations described follow each other so closely that all the materials are blended into a homogeneous mass. When repairs are needed they can be made by the city's laborers. The pavement consists of about 10 per cent. cement and sand grout with about 90 per cent. of rock.

HEALTH AND HELPS THERETO

Colorado Springs, Col.—The fumigations done this year, totaling 654, show the increased interest that is being awakened in this important work of the department. We are enforcing strictly the requirements and extending the limits of these requirements We say to people: "Do not rent houses without the assurance that they have been fumigated." This is an inexpensive precaution that anyone may take. Our experience shows that not only the communicable diseases can be prevented, but the colds and sore throats, occurring in a dwelling that has been occupied for some years, can be lessened or entirely eradicated by thorough fumigation. The work is done for a nominal fee to those who can afford to pay and our larger real estate firms have this year inserted a clause calling for fumigation by the tenant whenever they leave the dwelling. This rule extended amongst the agents of properties aids the department in the enforcement of its ordinances and regulations, and insures anyone who is renting from a reputable firm that the house is safe for habitation.

PETER OLIVER HANFORD, M.D., Health Commissioner.

Indianapolis, Ind.—Except possibly the tax and real estate transfer records, there are no records in the community of greater importance than the public records of the Board of Health. The records of the births, deaths, and contagious diseases, as well as of the water, milk, and other food examinations and live stock inspections, are kept in this office. The entire records of this office are kept, of necessity, in an old wooden case in the open office. A fire in the Board of Health office would destroy all the vital statistics of the city of Indianapolis, records which could not be replaced, and which are of inestimable value to the community. One not in intimate association with the office cannot realize the importance of the records and the manner in which they are referred to. Quite frequently matters of great legal importance are settled by the records of this office. Fireproof vaults should be supplied.

E. C. REYER, President, Department of Public Health and Charities.

New Haven, Conn.—I recommend the laws concerning the sale of milk be changed so that it will be unlawful to sell milk at a temperature higher than 50 degrees Fahrenheit, to deliver milk in uncovered pails, to fill bottles upon the streets, to place ice in the milk, if possible to sell at retail skimmed milk, and that all receiving licenses be required to file in the office of the Board of Health the names and addresses of those from whom they obtain their milk. I recommend a regulation against exposing meat in front of stores, upon wagons and in other places so that it may become soiled by dust, mud and other filth. I recommend a law requiring all vegetables, fruits, etc., exposed in front of stores or other places be so placed that the bottom of the container be at least two feet above the level of the sidewalk. It is also recommended that regulations governing lodging houses be enacted.

FRANK W. WRIGHT, Health Officer.

Philadelphia, Pa.—During the early part of the year experiments indicated that absolute disinfection was more likely to result from the use of much stronger solutions of formaldehyde than had been used in the past; in consequence we have substituted for the solution mentioned in the report for 1903, a mixture of equal parts of water and of 40 per cent. formaldehyde gas in water. This is sprayed by means of an atomizer especially designed by Dr. Stewart, of the Bacteriological Laboratory, in the proportion of three pints to the thousand cubic feet of air space under consideration.

A. C. ABBOTT, Chief of the Bureau of Health.

St. Paul, Minn.—Cleanliness and healthy outdoor exercise being absolutely necessary for the maintenance of good health, I came to the conclusion that the establishing of public baths and playgrounds, where they could be within reach of all, came under the province of the Department of Health. With this conception of duty, this department took the initial step to accomplish this object in the autumn of 1899. In planning and designing the buildings, I copied the most approved bathing institutions of this country and Europe, which I have had occasion to visit. My object was to have this work done and paid for with the aid of some of our public-spirited citizens, so as to make the entire establishment a gift of the people to the people, without any expense to the city whatever. There was but little enthusiasm shown by the public at the beginning, and not until the baths were firmly established and their benefits and usefulness demonstrated, did I receive any assistance in liquidating the accrued indebtedness. From the beginning of this undertaking in the fall of 1899, until August 1st, 1901, when the public baths and playgrounds were turned over by me to the city entirely free from debt, the whole expense was at my own financial risk.

JUSTUS OHAGE, M.D., Health Commissioner.

SPRINKLING STREETS

Haverhill, Mass.—Of the total length of streets, 136,462 feet, or 25.85 miles, were watered at an expense to the abutters, estimated to be 69.6 per cent. of the cost of the work, and 4.2 miles at the expense of the city. The total assessment levied was $8,036.50 on an assessed frontage of 237,042 feet, at the uniform rates of 3 cents per foot of frontage, on earth streets, and 4 cents per foot of frontage on block paved or macadamized streets, as determined by the Board of Aldermen. During the year thirty and five one-hundredths miles of streets have been watered, at a cost, as given in the auditor's report, of $11,672.33.

ROBERT R. EVANS, City Engineer.

Louisville, Ky.—Many germ diseases, such as consumption, pneumonia, and other diseases, are disseminated through the medium of dust coming from our macadam-paved streets more particularly. The use of crude petroleum oil as a medium for allaying the dust nuisance has been frequently recommended. Our city has not yet tried this experiment, but it has been used by the county authorities on one or two of the county roads for short distances, and I understand the experiment was satisfactory in the results obtained, but I am not advised as to the cost. I used the following language in my last report in discussing this question, which I think can be reproduced with propriety and may be of some profitable future benefit: "By the use of a concentrated solution of deliquescent salts, a very cheap, odorless and efficient liquid may be prepared which will not only prevent the dust from our streets arising, especially from those macadam-constructed, and thus being carried by the wind into our residences and business houses, and which may contaminate the air which we breathe, with various forms of germ life and putrid matter, but will, if properly prepared and used, also disinfect, deodorize and at the same time harden the dust material on any street where it may be used. This manner of sprinkling should recommend itself for economic reasons, and because it is odorless, germicidal and a disinfectant as well. The streets would therefore be made more durable."

M. K. ALLEN, Health Officer.

Rochester, N. Y.—One general ordinance was adopted early in 1905 covering all the streets where sprinkling was required so far as was known at that time. The work was advertised and let under a single contract, instead of being divided into groups. The average cost per mile was about $359.00, and per square yard, 2.27 cents, figured on a basis of 27 feet as the average width of street sprinkled. Total length of streets sprinkled, 116 miles.

THOMAS J. NEVILLE, Commissioner of Public Works.

South Bend, Ind.—The sweeping and sprinkling of streets was more expensive in 1905 than any other year for the reason that the miles of new pavement required additional sweeping and the district covered by hand sweepers was enlarged.

W. A. McINERNY, Chairman Board of Public Works.

Springfield, Mass.—The use of cars for watering those streets containing car tracks has been continued, a contract for such work having been made with the American Car Sprinkler Company, of Worcester, Mass., for the use of two cars during the whole of the season, supplemented by a third car during five months. A total of 21.73 miles of streets were watered under this contract. The balance of watering was done, as heretofore, under contract with individual team owners for horses and drivers, the carts being furnished by the city.

ARTHUR A. ADAMS, Superintendent of Streets.

Washington, D. C.—The dust cloud produced by the suction of a rapidly moving street car is due mainly to the sanding of the rails and to the disintegration of the asphalt paving immediately adjoining them. The flushing of the roadbed necessary to wash this finely divided grit out of the deep groove in the modern rail should properly be under the control of the street railway company, which also performs the sanding required for quick starting and stopping. I would earnestly recommend, therefore, that in all future franchises such periodic flushing be made a condition precedent to the granting of authority for the use of sand. The existing franchises do not provide for this flushing or sprinkling; and, if the two principal traction companies can be interested, it is planned to have them perform this work along some of their principal tracks, by the use of specially equipped tank cars.

HARRISON STIDHAM, Supt. Street Cleaning Department.

Worcester, Mass.—Our streets have been sprinkled, as usual, by the American Car Sprinkler Company, of this city. The usual high standard of excellence has been maintained, and all the conditions of the contract have been most satisfactorily fulfilled. The mileage sprinkled has increased from year to year, until this year it foots up 76-$\frac{2}{5}\frac{1}{2}\frac{5}{8}\frac{1}{0}$ miles, which cost for the year, including standpipes, hydrants, and repairs to same, $36,565.98.

WRIGHT S. PRIOR, Street Commissioner.

FLUSHING FACTS AND FIGURES

Allentown, Pa.—The practice of flushing streets has been carried on for several years. Streets were flushed with a fire hose at night by a gang of men who became quite expert at the work; they got up little low trucks which they placed at intervals under the hose and made the work of moving the hose much easier. At the present time flushing is done with a pressure machine and the cost of cleaning streets in this manner has been estimated at about half the cost of cleaning by hand sweepers.

Cleveland, O.—The city cleaned with flushers during 1904 11,694 squares at a cost of 62¾ cents per square of 10,000 square feet.

Dresden, Germany.—The asphalt streets are divided into thirteen routes, each containing 33,500 square meters of asphalt surface. The cleaning is done by a gang of from four to seven men under a foreman. First, the coarse dirt is removed with brooms, then the surface is wetted and scraped with rubber squeegees. The coarse dirt is removed in handcarts and the slime worked into the sewers. Each circuit is based on the distance coverable by a horse in five hours. In less frequented streets the flushing is done only on alternate days, being swept with brooms on every other day. The busy streets are flushed every day when the temperature is above the freezing point. When heavy rains occur the first sweeping and flushing are omitted, no cleaning being done except by the detailed sweepers who usually follow up the gangs.

Hamilton, Canada.—The asphalt paved streets were flushed periodically at night throughout the season by the carts, with satisfactory results.

St. Joseph, Mo.—Six or eight men were worked at nights during season at a cost of $548.41, flushing our chief asphalt and brick streets. South Sixth and Frederick avenue being washed several times during the summer. The hose used was a discarded hose from the Fire Department and a recommendation made is that the board purchase this department a flushing hose, as much time and money were spent in patching this old borrowed one.

St. Louis, Mo.—Flushing machines are generally used on all pavements except brick, where machine sweepers are used, except when the pavements are very dirty. The average cost of flushing a mile of street is $19 and the average cost per mile for machine sweeping is $8.50.

St. Paul, Minn.—The report speaks of the practice of flushing paved streets in the business districts at night, in order to remove the fine dust that cannot be gathered up by the hand sweeping. The amount of street covered by a crew in 1904 was generally a little less than two miles per night, or about 40,000 square yards. The cost of the crew was $17.15 per night, and the average cost was $8.75 per mile, or 43½ cents per thousand square yards.

Washington, D. C.—This work is now performed under contract expiring June 30, 1906, at the rate of 16 13-16 cents per 1,000 square yards. The contract provides also for hose flushing at the same rate, but no work of this character has been performed since the summer of 1903, when it was discontinued pending investigation by the Engineer Department as to possible injury to the asphalt surfacing. The report of that department was unfavorable, and hose flushing has not been resumed. Special attention was called in Superintendent Stidham's report in the "Notes to Estimates," to the needs of the department in this important but neglected branch of its work. "Not only should all of the unpaved residential streets be kept dampened," said the report, "(we now care for less than half), but a comprehensive system of sprinkling or flushing of the paved thoroughfares is urgently required. Washington is, so far as known, the only city of the first class that has no real sprinkling of its paved streets. The dust nuisance is manifest; and the financial and health losses involved by it constitute a heavier annual tax upon the community than would the cost of an adequate system of street watering—better still, of street flushing. Rochester, with a population of 181,500 spends $42,000 annually on street sprinkling; this year we expended only $8,429."

Wilmington, Del.—The sum of $13,266.20 was expended during the year for cleaning streets, and upon the request of the Board of Health, many alleys were cleaned for the first time by this department, in order to protect the health of the city, although not required by law so to do, said alleys being private property. Recently the cleaning of streets by flushing with water was given a trial, with the consent of the Water Department, and proved a great success, and will be used during the coming year in localities where filth accumulates rapidly.

SWEEPING STREETS

Albany, N. Y.—Throughout the entire season the Street Cleaning Department had nine sweeping machines in service, using 156 brooms. During the season previous eight machines were in service, and 140 brooms used. Increased facilities for doing this work are made necessary each year by the additional number of modern paved streets that have to be cared for by the city in this way. *CHARLES H. GAUS, Mayor.*

Atlanta, Ga.—I wish to call attention to the condition of the city streets for the past year. To my certain knowledge we have not had a single complaint at this office about dirty or filthy streets and very few complaints regarding the collection of garbage and night soil as compared to the past years.
JOHN JENTZEN, Chief of Sanitary Department.

Augusta, Ga.—Street cleaning consists of gathering up and carting away the droppings from the permanently paved streets. From the territory covered 1,161 loads of manure were hauled, besides large quantities of leaves and ashes. It has been the custom for years to sell this manure and that from the City Stables and Fire Department to the highest bidder. The income from this source for the past year was $300.00, which was the highest bid when proposals were asked in January. On account of the addition to the paved area, made the latter part of the year, it was difficult to keep the pavements in proper shape with the existing outfit. This trouble will be still greater if more pavement be laid during the coming year, which is likely to be done, and it will be necessary to purchase another street sweeping machine to add to the present outfit. Mr. Beaver, the Superintendent of this Department, believes the work can be better done by the use of street washing or flushing machines operated by compressed air, which have recently been put on the market. Two of these machines would be required, and as they are quite expensive (costing approximately $1,000 each), it will be best to look into the matter thoroughly and make a personal examination of their working before a decision to purchase is made. The cost of this work for the year was $2,519.04.
NISBET WINGFIELD, Commissioner of Public Works.

Concord, N. H.—Cleanliness of the streets above all else should be our purpose, not alone the cleanliness imposed on the Highway Department, but that other cleanliness which ought to be the duty of the citizen himself. The indiscriminate tossing into our streets of newspapers, handbills and wrapping papers, to be whirled about by every wind, is altogether too common. Such a habit scares horses, besides marring the natural beauty of our streets. *CHARLES R. CORNING, Mayor.*

Portland, Ore.—The average number of men employed each day in the Street Cleaning and Sprinkling Department is 53. They are divided into day and night shifts. The day shift consists of 35 men, who clean the streets improved with macadam and gravel. As there are 150 miles of streets improved in this way, the present force can only clean these streets once in each 200 days. The night shift consists of 18 men, who are detailed to clean the streets in the business portion of the city which are improved with hard-surface pavement. There are 53½ miles of such streets to be cleaned. It is, therefore, impossible to clean some of these streets more than once each week. The total expenditures of this department during the year 1905 were $60,945.46. As good work has been done in this department as was perhaps possible with the money expended. Nothing is more satisfactory than well-sprinkled streets in the summer season. It is also a factor in the health of the community, as it keeps down the dust and wind-blown disease germs. I regret that our present facilities are not more than half sufficient to meet the demands in this direction because of lack of funds. *HARRY LANE, Mayor.*

Rockford, Ill.—The street cleaning has been done as thoroughly as possible with the amount of money appropriated for this purpose. The macadam streets were thoroughly cleaned both in the spring and fall, and an accurate account kept of the number of miles and square yards of streets cleaned. The actual cost was 21 cents per hundred square yards, or $45 per mile, each time the streets were cleaned. I believe we could make a saving in our methods of street cleaning by dispensing with the carts used by the street sweepers and hauling the sweepings away with horse carts. This would do away with the piles of street sweepings which are now dumped on the side streets and which are very objectionable to the property owners in the vicinity of same; it would also save the expense of collecting a second time, which costs over $1,000 a year. *EDWIN MAIN, City Engineer.*

Winona, Minn.—Generally good work has been done in the street sweeping throughout the paved district, and the extensive sprinkling of the city's streets is such a boon in allaying the dust nuisance, besides being of undoubted sanitary benefit in lessening the amount of disease germs floating in the air, that it has become a necessity which all appreciate.
E. D. KEYES, M.D., Health Officer.

THE ICE SUPPLY PROBLEM

An Interesting Experiment

A FULL, proper and cheap supply of ice is becoming each summer a more difficult problem to solve. The present season, especially, is experiencing a scarcity of supply, difficulty in delivery and a skyrocketing of prices all over the United States which have caused not only much anxiety but considerable alarm. In a country with a humid climate like this one possesses, a constant and regular supply of ice is as necessary as water, light or transportation. Ice—for refrigerating purposes alone—makes for health, renders climatic conditions bearable, besides preserving foods which otherwise could not be used, or would become the cause of considerable danger. Natural, or surface, ice, usually gathered from rivers and lakes, can not always be depended upon for either purity or quantity. A sewage leakage into the one, may work untold mischief, while a mild winter will considerably affect the other. Dealers, both wholesalers and retailers, would not be human unless they took every advantage, as they readily do, to increase prices and make extra profit.

It looks as though, as time goes on, that municipalities will, in mere self defense, have to install their own ice manufacturing plants so as to be in a position to guarantee a regular, even-priced supply of the commodity at any and all seasons of any and all years. The well-being of a community demands these things and public opinion is strongly and insistently waking up in the direction of municipal ownership or control of ice plants.

Mount Vernon, N. Y., owing to difficulties in the supply of ice, over which it has had no control, has lost no time in experimenting in this direction, and has contracted for a plant to be erected within sixty days and to cost $50,000 —the average time required is four months—in this way hoping to be made absolutely independent of any dealer, or indeed of any kind of ownership other than municipal. The working out of things in this township will, therefore, be watched very carefully by hundreds of other towns and cities similarly situated and experiencing the same difficulties.

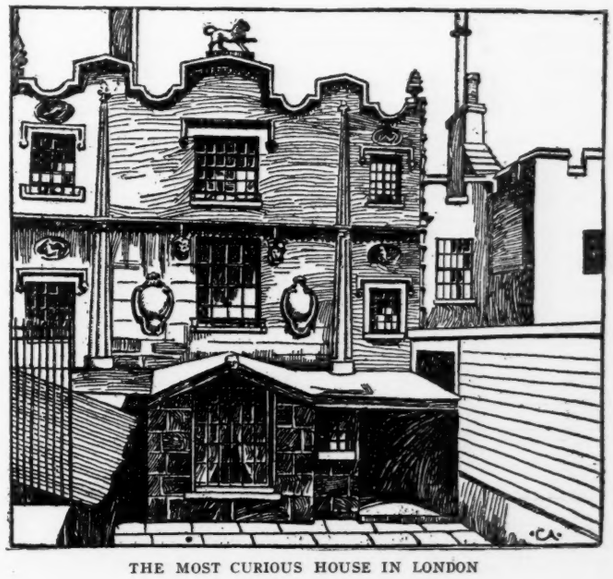
It is interesting to note that the plant proposed to be erected at Mount Vernon can be worked with eight men, namely, a day engineer, a night engineer, a day fireman and a night fireman, with four others as helps. It will turn out 50 tons a day. Two tons a day per 1,000 population is generally the rough estimate of necessary supply in the average town, although it is both wiser and safer to at least double this. Mount Vernon has a population of 25,000. The actual cost of producing ice by a plant of this kind can only be ascertained by practical working. It is claimed that it may range all the way from 50 cents to $2 per ton, or even more, all depending upon the skill and experience of the engineers and others in charge, economy in fuel, rent and other expenses. Even if it costs $6 per ton of 2,000 pounds, this is at least as low a price as it can be obtained from through any dealer. Municipal control or supervision should also give an additional promptness in distribution that should closely rival the local delivery of mail.

It will be further interesting in this connection to see whether ice can not be used and delivered in small, regular shaped pieces, say in cubes or bricks of from ten pounds to twenty pounds weight each, or in such sizes as will readily fit the refrigerating boxes of the average household. This will be much more convenient than the present unwieldy 11 by 22 by 44 blocks weighing 300 pounds each—in the South ice is usually made in blocks of fifty pounds for the reason that manual labor in that part of the country is more easily "tired"—which have to be broken up before they can be distributed to customers, except, of course, in the case of large consumers. There may be more waste from melting, owing to the greater surface being exposed in the case of cube or brick ice, but would not this be fully balanced by the waste at present caused by breaking up the large blocks? Refrigerating automobile delivery wagons might also be used furnishing additional coolness and quickness in distribution. These would entail an extra outlay for installment, but it is believed that the results would fully compensate. We are assured by the De La Vergne Company, who are manufacturing and erecting the Mount Vernon plant, that such things are feasible and possible.

There can be no question as to the superiority of manufactured ice in every way from a sanitary point of view. It is harder, is practically sterilized, is much brighter and more attractive in appearance and cuts easily if properly dealt with.

The men handling the product should all wear washable clothing like the White Wings, which, under a city's oversight, could be kept up to a standard point of cleanliness. This would of necessity do away with the untidy regiments of unsavory looking mortals who now operate deliveries.

Mount Vernon is wished every success in her undertaking and it is hoped that the outcome may be a universal imitation throughout America of her enterprise.



THE MOST CURIOUS HOUSE IN LONDON

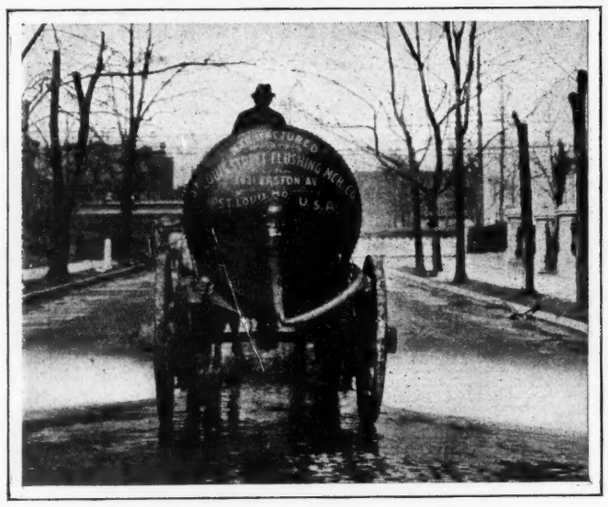
STREET FLUSHING MACHINES

THE argument for street flushing machines, that the dry dust on pavements contains bacteria, was demonstrated some years ago by researches made under the direction of Dr. Woodbury, Street Cleaning Commissioner, New York City. After twelve hours of dry weather, gelatinous plates were exposed to the air on Fifth avenue, a thoroughfare well cleaned with water, and on Lewis street, between Rivington and Stanton streets, East Side, which is hand swept and granite paved. The plates, after half an hour's exposure, were examined in the laboratory in the customary way, and it was found that there were 104 colonies of bacteria on the Fifth avenue specimen and 6,780 colonies (covering an equal space) on the Lewis street plate. The death rate for Lewis street for the preceding year was 22.34 per 1,000, and no further evidence that street dust is an active agent in the transmission of disease seems necessary. Washing is the most usual

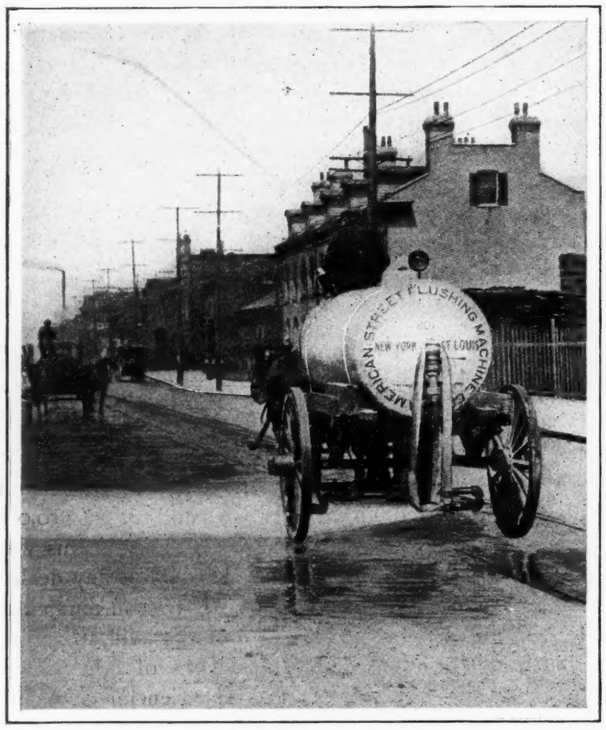
MODERN WAY OF SPRINKLING

method of getting rid of dirt everywhere, and the washing of streets with a fire hose has been practiced in a desultory sort of a way in many cities for years. The clumsiness of the method and some incidental disadvantages have prevented its general adoption. Among the objections are the large and uncertain amount of water used; a hose in the street is a serious obstruction to vehicles; pedestrians on the sidewalk are liable to get wet owing to the difficulty the men have in controlling the stream; the volume and force of water have an appreciable effect in disintegrating some pavements and the products of disintegration that would not be disturbed by a properly directed light stream from a machine are thus washed into the sewers, where they may cause trouble.

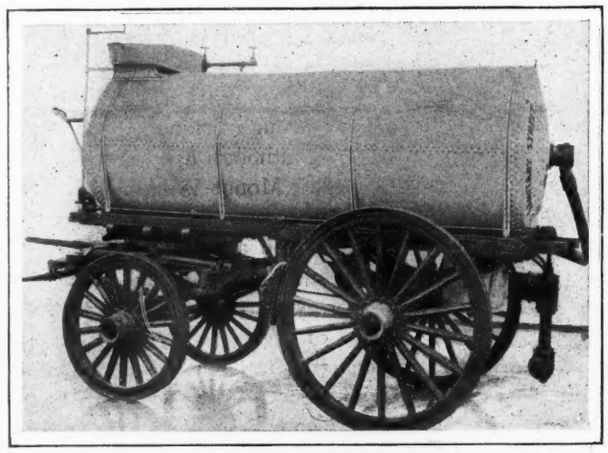
A street flushing machine is a cylindrical steel tank mounted on a truck like an ordinary street sprinkler and having some way of maintaining an air pressure by means of which the water is forced out of the sprinklers as desired. Methods adopted by different manufacturers for



STREET FLUSHING MACHINE—REAR VIEW



A MODERN FLUSHING MACHINE



A STANDARD SPRINKLER

HOW THEY USED TO DO IT

creating the air pressure vary. A subsidiary tank may be highly charged from a small air compressor conveniently situated; or the pressure may be obtained direct from the water mains, all outlets for air in the tank being closed as the water is drawn in. Working pressures on different machines vary from ten to one hundred pounds per square inch, and each make of machine has a special device for controlling the pressure. The nozzle of the flusher is an important consideration, governing as it does the delivery of the water on the pavement. The details for bringing about the desired results vary in each machine and have some relation to the working pressure.

Controlling the delivery of water on the pavement, as all these machines do to a greater extent than an ordinary sprinkler or a hose, some economy in use would naturally be expected and such results are claimed by the various manufacturers of the machines and have been confirmed by city officials who have looked into the question. One manufacturer estimates that less than one-half gallon of water to one square yard of pavement, applied six days in the week, will keep an ordinary surface sanitarily clean. A Superintendent of Street Cleaning says that three machines have cleaned an average of 62 blocks in an eight-hour shift. Another superintendent states that with two machines he has cleaned 18 miles of streets better than ever before and at a saving in cost of 40 per cent. over the previous year's figures.

Among the makers of flushing machines are: Sanitary Street Cleansing and Sprinkling Machine Co., St. Louis, Mo.; St. Louis Street Flushing Machine Co., St. Louis, Mo.; D. Connelly & Co., Cleveland, O.; American Street Flushing Co., New York City and St. Louis, Mo.

STREET SPRINKLING

How to Keep Roadway in Good Condition—Average Cost—Methods Employed in Various Cities—Indianapolis and Newark Compared

"HAVE the dust always damp, never wet," is the secret of ideal sprinkling. Sprinkling is to "lay" the dust, not to remove it; although the latter may be accomplished by flushing with water. It follows that to properly sprinkle a city requires a large number of carts, so that each stretch of street may be passed over two or more times a day. The frequency of sprinkling, however, should be regulated by the amount of shade on the street; and if the street be well shaded one sprinkling a day may be more effective than four or five on an unshaded street. In fact no practicable number of sprinklings will prevent the formation of dust on an unshaded dirt or macadam street under a hot sun—an important argument in favor of shade trees throughout a city.

METHODS EMPLOYED

The manner of sprinkling is almost as important as the frequency. On a porous pavement, water left in pools will soak into the ground rather than spread along the surface; and on impervious pavements mud is formed which is generally objectionable where these expensive pavements are laid. The water should therefore fall in as fine a spray as possible, but the drops of this should be separated but little from each other. One or two thin sheets of spray only may be largely evaporated before reaching the ground on a hot day. The particles of water should be not only fine, but they should fall with little velocity, so as not to cause the dust to fly, nor to bore holes into the ground, nor wash sand filler from joints. There is not so much objection to this velocity where the pavement is of a compact surface with cement or pitch joints or no joints at all; but if the sprinkling cart is to be used at all on macadam or dirt pavements or sand filler it should be adapted to them. For ordinary use, therefore, a cart should deliver a heavy spray of very fine drops which should leave the nozzle horizontally or at an angle above the horizontal; and this spray should be so distributed as to cover entirely the space between and for a distance outside of the wheels.

CARTS FOR SPRINKLING

City sprinkling carts generally hold about 500 to 1,200 gallons, and are drawn by one or two horses. Allowing for time lost in filling the carts, each one can sprinkle once from two to four miles of street a day, depending upon the width of pavement. The cost in the various cities is difficult to obtain, but seems to run about 1 to 3 cents a front foot a month for one sprinkling a day. During various years Indianapolis paid 1 to 1.7 cents per front foot per month for three sprinklings daily. Newark paid 1 cent per foot per week for two sprinklings daily. Cincinnati 2 cents per month per foot.

The amount of water used in Indianapolis was 0.38 gallons per square foot per month for each sprinkling. In St. Paul 1.5 to 2.9 gallons per foot of 40-foot pavement per day, depending upon the temperature; 40 per cent. being paved, the balance of earth.

Laying of dust is not the only advantage from sprinkling. In most of the large cities it is resorted to in midsummer, especially in the tenement districts, for cooling the air. Also on macadam the prevention of raveling depends upon the binding material being kept moist, and where the shade is not quite dense this necessitates sprinkling during certain weeks or months. In Montclair, N. J., for this reason, "In hot, dry weather the wagons are expected to cover nearly all the macadam streets."

BROADWAY BOULEVARD BAD

Reasons for Improving One of Principal Thoroughfares in Borough of Manhattan—Work of Washington Heights Taxpayers' Association

By REGINALD PELHAM BOLTON,
Secretary, Washington Heights Taxpayers' Association

THE recently published statement that the President of the Borough has let contracts for the paving of a part of Broadway, on Manhattan Island, has drawn attention to the fact that a portion of our principal thoroughfare has remained to this late date in the condition of a country road. From One Hundred and Thirtieth, or Manhattan street, northwards, Broadway is, for two miles, the "Boulevard," planned under Tweed's administration, on the line of Eleventh avenue, the finest and straightest section of the famous highway. Its course at One Hundred and Sixty-ninth street is diverted into the line of the old Albany Post Road or Kingsbridge Road, and the remaining portion on the direct line of Eleventh avenue has, after several baptisms, become designated as part of Avenue St. Nicholas.

The result is confusing, and illustrative rather of the lack of system out of which arose the perplexities of London and Boston, rather than of modern method. The haphazard manner in which our streets and avenues are named, however, is a subject by itself, and the incongruous absurdities fastened upon our thoroughfares would fill a book upon the subject of the vagaries and ignorances of officialdom.

Above One Hundred and Fifty-third street Broadway has been cut through the cemetery of the corporation of Trinity Church, and from this point north, for some inexplicable reason, the broad roadway was narrowed no less than thirty-two feet, and the sidewalks made wider to that extent. The first effort for improvement of the road, taken by a public-spirited member of the Washington Heights Taxpayers' Association in 1903, was to draw attention to this change in the character of the roadway, and urge the widening of the roadbed in conformity with the southerly portion.

This step being secured by the action of the association, an ordinance establishing central park plots, similar to those below One Hundred and Twenty-fifth street, was passed through the Board of Aldermen by the interested work of the local Alderman, Mr. Max S. Grifenhagen, and last fall the Mayor's signature decided this public improvement, for which later the finance committee of the board, under the chairmanship of Alderman John R. Davies, who gave much attention to the subject, recommended an appropriation of $40,000, which is now to be expended on the work.

Meantime the association petitioned for the widening of the street, and this work was done some months ago, since when the street has presented a peculiar appearance, the gas lamps, catch-basins, and gutters being left out in the roadway.

Subway Operations

The operations of the construction of the Subway cut much of this road to pieces, and its restoration was done in a most negligent and slovenly manner, which work, however, despite the protests of the association, many of whose members had witnessed the work, was forced on the acceptance of the city, through its acceptance by the engineers of the Rapid Transit Commission.

The first steps have been taken towards tree planting along the sides of the road and the favorable action of the Park Board has been secured for this purpose, but here another difficulty has arisen.

Along the westerly side of upper Broadway there existed for many years a line of massive telegraph masts, on which were supported the main lines of communication from Manhattan to the north. These great poles, twenty inches in diameter, and of unusual height, carried no less than 140 wires, besides trunk cables.

On the completion of a Subway line, which was carried out during the construction of the tunnel work, all the telegraph and main telephone wires were taken down, leaving only a few branch telephone connections and the local police and fire lines. Rather than place new and suitable poles, some person in authority, whose name should be pilloried here for an example to future iconoclasts, caused the existing masts to be cut down to ordinary height so that, for the past two years Broadway has been disfigured by these great stumps set 75 feet apart, holding up one cable and four telephone wires! Persistent agitation by the association has resulted in locating the responsibility of the present maintenance of this nuisance, upon the Fire Department whose cable alone is used to justify the retention of the stumps.

Microbic Melody

"Sing a song of microbes,
Dainty little things,
Ears and eyes and horns and tails,
Claws and fangs and stings.
Microbes in the carpet,
Microbes in the wall,
Microbes in the vestibule,
Microbes in the hall.
Microbes on my money
Microbes in my hair,
Microbes on my meat and bread,
Microbes everywhere.
Microbes in the butter,
Microbes in the cheese,
Microbes on the knives and forks,
Microbes in the breeze.
Microbes in the whiskey,
Microbes in the beer,
Microbes in the milk and tea,
Microbes by the year.
Microbes in the kitchen,
Microbes in the bed,
Microbes on the brush and comb,
Microbes in my head.
Microbes in the faucet,
Microbes in the drains,
Microbes in my shoes and boots,
Microbes in my brains.
Friends are little microbes,
Enemies are big,
Life among the microbes is—
Nothing "infra dig."
Fussy little microbes,
Billions at a birth,
Make our flesh and blood and bones,
Keep us on the earth."

—*Exchange.*

THE DISPOSAL OF MUNICIPAL WASTE

Systems and Methods, with Special Reference to Conditions in Great Britain, Europe, India, Australasia, South Africa and Canada

By WILLIAM F. MORSE, Sanitary Engineer, New York

This Series of articles begun in the February number, will be continued until completed and will be illustrated by original drawings, cuts, diagrams and pictures, and contain many tables valuable for reference.

The Subjects Already Treated by the Author Are:—

1. The Waste Collection Service in American Towns; Methods and Results.
2. Definition of Terms; Quantities; Proportions; Character of Waste in General.
3. Garbage; Analysis; Proportions; Values.
4. Dry Refuse and Rubbish; Quantities and Treatment.
5. Classification:—Commercial Values after Recovery.
6. The Refuse Utilization Stations in New York, Boston, Buffalo, and Brooklyn (illustrated).
7. Municipal Ashes; Analysis; Proportions; Values when Separated.
8. Ashes from Cremation of Garbage; Analysis and Values; Comparative Table.
9. Comparison of Ashes from English and American Cities; Cremation Means.
10. The Utilization of Municipal Waste in General; English and American Methods.
11. Commercial Values of Refuse and Ashes when Marketed and Manufactured.
12. The Analysis of Garbage; Tankage, Its Value (Special Tables).
13. The Garbage Disposal Plant, Cleveland, Ohio.
14. Street Sweepings; Fertilizing Value and Treatment.
15. Comparative Commercial Values of Waste.
16. Foreign Destructors; Special Chapter by an Eminent Authority.

The Following Are to Appear:—

17. Methods of Disposal; Cremation.
18. Beginning and Progress.
19. Apparatus and Furnaces; Record of Work (illustrated).
20. Apparatus and Furnaces; Record of Work; Results.
21. Types of Furnaces; Their Employment; Municipal, Institutional, Industrial, Medical, Laboratory (fully illustrated).
22. Calorific Value of Waste as Fuel (comparative table).
23. Reduction and Extraction Process Described and Illustrated; the Earlier and Later Methods.
24. American Methods; Col. Waring and His Successors.
25. Present Situation in This Country; Résumé.
26. Means for Improvement as Suggested by Several Investigators.
27. What May Be Expected of the Future.

Special Article

By W. FRANCIS GOODRICH, A.I.Mech.E., F.I.S.E.

HAVING in mind the splendid services which Colonel Morse has rendered in the cause of sanitary reform for many years past, I gladly respond to his invitation to present the existing situation in the United Kingdom, British Colonies and Europe, in so far as the final and sanitary disposal of refuse is concerned.

Thirty years have passed since the late Mr. Alfred Fryer erected the first furnaces for burning refuse, coining the term destructor, which is now universally understood in all countries as the only satisfactory means to an end, the sanitary desideratum—disposal by fire.

While in your country from the Atlantic to the Pacific during the past twenty years not much real progress has been made, it is possible to record in Great Britain steady and consistent progress, with but very few failures. I shall be well within the mark if I say that less than ten destructors have been pulled down or abandoned in Great Britain during the past thirty years. The earliest destructors erected in this country are still in daily use in Manchester, Birmingham, Leeds, Hull and other cities, and although they suffer by comparison with modern installations in these same cities, yet in fairness it must be said that they have done, and continue to do, that work for which they were erected.

Those American writers who have attributed the progress which has been made in Great Britain to the fact that refuse disposal has been treated as an engineering problem may rest assured that they are correct. For many years past a few well-known engineering firms in England have devoted very close attention to those combustion problems and other problems involved in the designing and erection of destructor furnaces of the highest all-round efficiency, with the result that finality in the essential principles has now been reached, and the only possible improvements in the future will be in details affecting the labor cost for operation, the clinkering process, and the profitable treatment of the residuals. Those who have closely followed the progress in final and sanitary refuse disposal in Great Britain will agree that the demonstration of the fuel value of refuse has been a potent factor making for the sanitary ideal. While there must ever be a constant striving after the highest efficiency in sanitation, yet it would be idle to pretend that nearly 250 municipalities in Great Britain would at this time have had destructors in operation had the power aspect not been so clearly and conclusively demonstrated.

Many worthy councillors with but a very hazy notion of sanitary necessities have been fascinated with the possibilities of power production; to their credit it must be said that they have grasped the economic aspect, and realizing that the sanitary ideal could be reached without any material addition to the rates they have, in not a few instances, led the municipal engineer instead of being led by him.

I have already observed that some 250 municipalities in the United Kingdom now have destructors in operation; in about 130 cities and towns the destructors are either combined with electricity works, sewage works, waterworks, or other municipal undertakings, providing power which would otherwise involve a definite expenditure for coal, gas or oil, as the case may be.

Fig. 18 illustrates the first six destructor cells erected in Great Britain, these being the original Fryer cells erected at the Water street depot of Manchester Corporation in 1876.

Still in daily use it is interesting to add that within the past three years Meldrum's forced draught and grates have been added to this battery of cells at this depot, materially increasing the temperature and destroying capacity.

Fig. 19 will serve to convey to the reader what has been accomplished in the thirty years which have passed since the late Mr. Alfred Fryer erected his first destructor cells.

This diagram will serve to show (1) the total number

FIG. 18—FIRST SIX DESTRUCTOR CELLS IN GREAT BRITAIN; (MANCHESTER, 1876)

of installations, (2) the number of plants erected by each maker, (3) destructors combined with sewage works, (4) with electricity works and (5) with waterworks, as also the proportion of idle or semi-idle plants (*i.e.*), destructors from which the power is either only partially utilized for works purposes, or allowed to go to waste.

While the proportion under the latter category may seem high it must be remembered that many of these plants are old, being erected long before the power aspect of refuse disposal had received any serious consideration.

Any contribution concerning the present position of refuse disposal in Great Britain would be incomplete without some reference to the main combinations of destructor and power plant, which have played an important part in the later development of British refuse destructors. We will, therefore, briefly review the combinations of destructors with sewage works, electricity works and waterworks.

Destructors Combined with Sewage Works

This desirable combination has found much favor, and at the present time some forty-five installations are in operation in various parts of England and Wales, while many similar works are projected.

In not a few towns the sewage works are so located that the combination is an impossible one because of the cost of haulage. This obstacle, as also the fact that at many sewage works gas engines or oil engines are employed, has operated against the more extensive adoption of destructors, and, to some extent, will continue so to do. To utilize the available power from the solid refuse of a community to pump its liquid refuse—the sewage, and further to utilize the residual clinker from the solid refuse for the bacterial treatment of the sewage, appeals to many as an ideal combination—as indeed it is.

To the Cathedral City of Hereford belongs the credit of installing the first destructor in conjunction with a sewage works. This destructor of the Meldrum front-fed type has now been at work daily since 1897. About one and one-half million gallons of sewage is pumped to a height of 36 ft. in a ten hour day, the total cost of the destructor installation was about £1,200, and a coal bill of about £400 per annum has been entirely saved, not one pound of coal having been burned since the destructor commenced work, the total cost of repairs and maintenance during nine years has been £34 only. Ten tons of refuse are burned daily and, in addition to pumping, steam is also provided for operating sludge presses, lime mixers and other auxiliary plants.

The vexed question as to whether or not it is possible for a destructor to be operated as a financially reproductive undertaking has been clearly disposed of in so far as combined sewage and destructor works are concerned.

In fact, they have exceeded all expectations in most cities where an account has been kept of operation and other data of the plant. In America there is no doubt as to their success, while in Europe and other countries each year generally shows an increase in saving when properly managed. There should be little hesitancy on the part of wide-awake municipalities in adopting this plan, judging from the results which have so far been attained.

The following table, No. XXVII, clearly sets forth what has been done at twelve combined works. It will be observed that in no less than seven towns a net annual surplus in relief of the rates is shown after meeting all capital and standing charges.

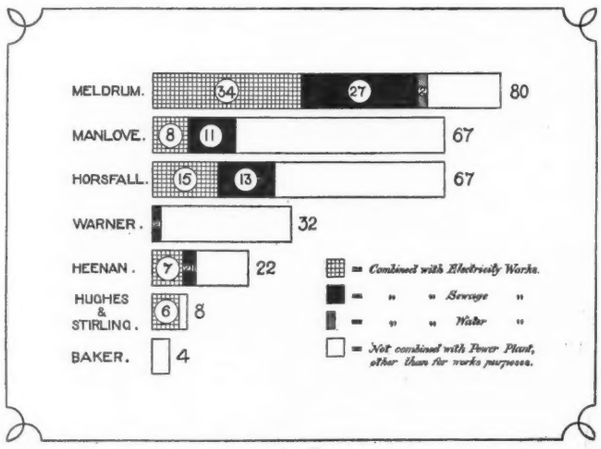


FIG. 19—DIAGRAM—THIRTY YEARS' PROGRESS WITH BRITISH DESTRUCTORS

TABLE No. XXVII

TWELVE COMBINED DESTRUCTOR AND SEWAGE WORKS.

TOWN	Weight of Refuse Destroyed Daily	Gross Annual Saving	Labor Cost Per Ton of Refuse Destroyed	Capital Cost of Destructor and Steam Raising Plant
*Aldershot	14	£ 568	9d.	£1,200 exclusive of boilers & chimney.
East Ham	30	1,000	1s.7d.	£12,600 including buildings & chimney.
*Eccles	28	750	11½d.	£4,500 exclusive of boilers & chimney.
*Epsom	10	556	11d.	£4,510 including buildings & chimney.
*Hereford	10	400	1s.	£800 exclusive of boilers & chimney.
Leamington	35	183	.....	£6,310 excluding chimney only.
Luton	23	500 estimated	1s.3½d.	£5,000 excluding chimney & one boiler.
*Lytham	12	370	8d.	£2,400 including building & chimney.
Taunton	20	=118.16.7	8½d.	£4,000 including building & chimney.
Talthamstow	60x	650	1s.	£9,000 including buildings & chimney.
*Watford	25	=893	1s.	£6,800 including buildings & chimney.
*Weymouth	18	†451	11d.	£4,600 excluding one boiler & chimney.

* A net surplus available after meeting all capital and standing charges.
= 1904 Figures.
x 40 tons of refuse and 20 tons of sludge
† Not including £ 234 per annum saved in cartage cost.

The following interesting figures are available from *Eccles* for the past year, these being extracted from the annual report of the Medical Officer of Health, Dr. W M. Hamilton, M.D., D.P.H.:

Total weight of refuse destroyed..... 10,975 tons.
Average weight of refuse destroyed daily... 29.79 "
Labor cost per ton of refuse destroyed..... 11½ d.
Total water evaporated..... 20,429,360 lbs.
Daily evaporation..... 66,550 "
Average evaporation throughout the whole year per lb. of refuse destroyed..... 1.002 "
H.P. developed continuously at 20 lbs. per H.P.. 138 H.P.
Total weight of clinker..... 3,464 tons 12 cwts.
Percentage " " 32.57
Revenue from " .....£433, 1s, 4d.

"The pumping and treatment of the sewage of the borough has been carried on without intermission the whole year through. The destructors (Meldrum's front-fed type) have also been in continuous operation. The whole of the steam required for the pumping engines has been evaporated by the refuse destroyed in the destructors."

THE WATFORD DESTRUCTOR AND SEWAGE PLANT

One of the most successful combined sewage and destructor works is that of the Watford Urban District Council, situated about 17 miles north of London.

Here a Meldrum front-fed regenerative destructor deals with an average of about 27 tons of refuse daily, working continuously for about 150 hours per week. Steam is supplied at a pressure of 120 pounds to Worthington pumps and air compressor engines. About one willion gallons of sewage is pumped every 24 hours to a height of 84 feet, while an additional half million gallons is dealt with by the air compressors and ejector plant.

The destructor was started on March 31, 1904, and the following figures (Table No. XXVIII) covering the first two years of working, are perhaps without parallel among combined works of the kind. After meeting all capital and standing charges, there remains a *net* surplus in relief of the rates of about £150 per annum.

Fig. 20 illustrates the general arrangement of the destructor plant at Watford; it will be observed that in addition to steam generation the hot gases after passing the boiler are further utilized for heating the air for combus-

TABLE –No. XXVIII

WATFORD URBAN DISTRICT COUNCIL COMBINED SEWAGE AND DESTRUCTOR WORKS

Statement showing saving effected by *Meldrum Destructor* for first two years working compared with the previous cost when burning Steam coal, together with the report of the Medical Officer of Health for 1905.

		COAL Tons	Cwts		
Year ending March 31st, 1904:	*Before* erection of Destructor	1,068	5	@17-8 =	£943.12.7
" " " " 1905:	*After* erection of Destructor	183	8	@17-5 =	159.04.5
" " " " 1906:	*After* erection of Destructor	274	16	@17-1 =	235.12.7
1st year's working of Destructor:	Saving in coal bill			=	£783.18.2
	Add revenue from sale of clinker			=	101.08.9
	Sale of old tins			=	8.02.4
2nd year's working of Destructor:	Saving in Coal Bill			=	708.00.0
	Add revenue from sale of clinker and residuals			=	202.06.6
	Total saving for two years				£1,803.15.9
	Total cost of repairs and maintenance for two years			=	£16.19.0

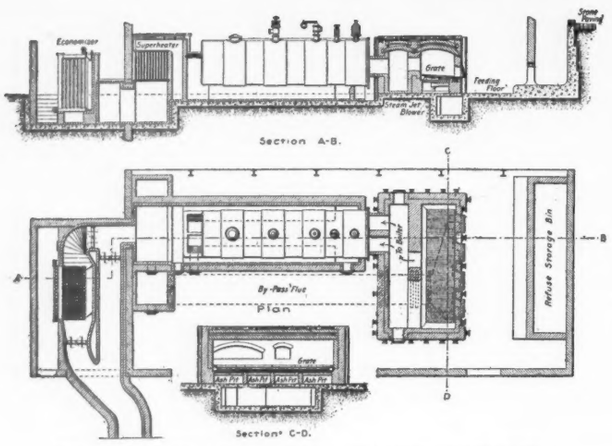


FIG. 20—PLANS AND SECTIONS, WATFORD DESTRUCTOR

tion in a Meldrum regenerator and also for heating the boiler feed water in a Greens economizer, the temperatures being respectively about 300° F. and 250° F., the heating surfaces of the boiler, regenerator and economizer reducing the temperature of the gases from an average of 1,800° F. in the combustion chamber before the boiler, to about 400° F. at the chimney base.

Fig. 21 is reproduced from steam pressure recorder diagrams and clearly shows how steadily the pressure is maintained throughout one day's ordinary work. The diagrams of a week's work are almost exactly identical with this.

Clinker for Fuel Beds

The value of destructor clinker for bacteria beds has now been clearly established and there is an enormous and constant demand for large quantities all over the country.

It is no exaggeration to say that in good vitreous clinker has been found the most suitable material yet discovered. At Aldershot Urban District Council Sewage

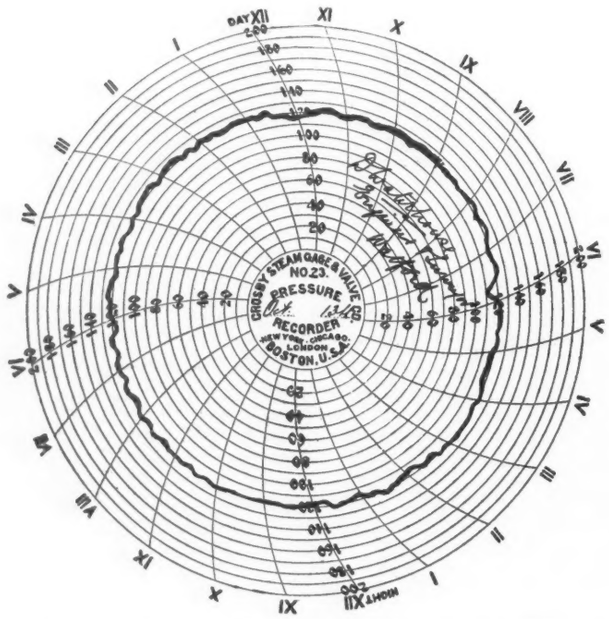


FIG. 21—DIAGRAM SHOWING ONE DAY'S STEAM, WATFORD DESTRUCTOR

Works some beds made up with destructor clinker over five years since are still in use with the original material, while at these works, coke which was previously used has disintegrated, and after being removed as useless it has been passed through the destructor with refuse, emerging therefrom as a useful clinker to be again used in a changed form for the same duty.

A year since, when the writer was invited to give evidence before the Royal Commission on Sewage Disposal concerning the cremation of sludge, he was also requested to lay before the Commissioners some evidence regarding the combination of destructors with sewage works.

Some very exhaustive tables prepared by the writer for this purpose will be found in the next report of this Commission, and to those especially interested in combined destructor and sewage works these tables should be exceedingly useful, bringing together a mass of facts and figures in concise form.

What the recommendations of the Royal Commission on Sewage Disposal will be concerning this combination remains to be seen; it has been facetiously suggested that ere their labors are complete every sewage works will be a combined undertaking

Destructors Combined with Electricity Works

During the past ten years some 70 municipal authorities have adopted this combination, generally speaking, with very satisfactory results. While the production of electric light from refuse has held many Councillors with a peculiar fascination, it never has appealed to the Electrical Engineer, and although many are now disposed to adopt a more friendly attitude towards the combination, it is no exaggeration to state that the progress which has been made is, on the whole, not due to the Electrical Engineer, but rather in spite of him.

Electricity works are usually centrally located and their position offers an ideal site for the destructor from the point of view of haulage costs. As the cost of refuse collection and haulage has nothing whatever to do with the electricity department, the Electrical Engineer cannot be induced to consider this factor—an all-important factor from the ratepayers' point of view.

The view of the Electrical Engineer has been purely departmental or personal; he does not want the destructor; why should he have it? The question of cartage costs or power utilization, both of vital importance to the ratepayers, do not, as a rule, appeal to him, although he is their servant.

While this narrow and illogical view has not been without its effect in thwarting the adoption of destructors in combination with electricity undertakings, yet very satisfactory progress has been made. It is not possible to include figures such as those in Table No. XXVII or similar to those available and here included in connection with combined destructor and sewage works, not because the destructor is minus a satisfactory financial side, but rather because accounts are not kept in that clear and separate form which is so desirable with every municipal undertaking.

(*To be continued.*)

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NEW YORK, AUGUST 1, 1906.

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EDITORIAL

Stream Pollution in the United States

COMPARISONS unfavorable to the United States have occasionally been made between the laws in this country forbidding the pollution of streams, and those in England. That the statute restrictions in the latter country have been and are more severe than in any State of the Union is undoubtedly true; but that this apparent tendency really indicates a less sanitary condition of our streams or a less intelligent popular idea or general appreciation of sanitary laws does not necessarily follow. If the local affecting conditions in the two countries be examined a reason for the more stringent laws in England becomes apparent. To begin with, sanitary control of streams is vested in the general government in England; but in the several State governments in this country, which fact tends to restrict stringent sanitary laws to those States where their need is most pressing. Again, the streams there are very much smaller than in the more thickly settled parts of this country, and consequently the amount of dilution to which the per capita sewage would be subjected is much less there than in this country. Further, the cities upon any one English stream follow each other at much shorter intervals, and therefore the stream has less opportunity there than here to assimilate the organic matter contributed by one city before it reaches the following one. There are undoubtedly other reasons, but these three are of themselves sufficiently explanatory.

If we inquire into the circumstances prompting the enactment of anti-pollution laws in the two countries, we find even less reason for self-condemnation. For the Passaic River, in its foulest days, never reached the nauseating condition of the Thames during the first half of the nineteenth century, when the gases of putrefaction arising from its surface commonly produced vomiting in those sailing to the port of London, and necessitated the adjourning of Parliament, which referred to the condition as a "National disgrace." Other instances might be cited to show that this country has never required the strong inducements England had before abating this class of nuisance.

On the other hand, we are to blame if we do not profit by the experience of our cousins; and, now that the necessity for preventing the fouling of streams is so well known and the means for accomplishing it available, it will be our national disgrace if our streams are ever permitted to reach the past condition of the Thames or the Passaic. The things of the past should be the beacons of the future, and nowhere more than in municipal work is the observance of the truth necessary.

As is to be expected, the most stringent laws in this country are found in the most thickly populated States; but sanitarians throughout the United States are educating the people and their legislators to a realization of the threatening dangers, and to forestall and prevent, by timely laws, the establishment of sewerage systems or other plants which, discharging into our streams, must ultimately become the cause of nuisances.

Note.—The City Council of Coldwater, Mich. (population 7,000), has subscribed for 10 yearly subscriptions of the MUNICIPAL JOURNAL AND ENGINEER.

Cheap Gas

IT is interesting to note that whilst a great flood of comment, inquiry and discussion is covering this country from end to end respecting the price of gas to the consumer, a glance at things in this regard on the "other side of the pond" shows such a marked difference as to what is paid there for this commodity that the matter is well worth quoting. Without particularly specifying Glasgow and Birmingham, where the subject has been made one of special experiment, practice and administration for many years with the effect of reducing the price to 50 cents per thousand in Glasgow and to 56 cents in Birmingham respectively—about half of the average paid in the United States—it is well to take one of the smaller towns where, it must be granted, the facilities of purchasing raw materials are not so advantageous as in the larger ones. Here we find a still even greater reduction in price. Widnes in Lancashire, with a population of 30,000, supplies its gas to small consumers at 30 cents, to large consumers at from 22 cents to 26 cents, and yet, in spite of this, made a profit on its works in 1895 of no less than $22,887.15. It is rightly claimed that this is the lowest price gas in the world, although througtout Great Britain the general range of price hovers between 40 cents and 70 cents. When we consider that New York companies, with every advantage that can possibly be possessed for the delivery of coal, charge one dollar per 1,000—that is, nearly five times the price that Widnes charges—and the company is in arms because the citizens, not unnaturally, possess the idea that they ought to be supplied at the not unreasonable figure of 80 cents, as specified in the charter, it strikes one that when a somewhat ordinary town, chiefly populated by the working classes, can bring down the price to 22 cents, besides building up a handsome surplus, there is something rotten somewhere in New York City. Widnes gas supply is under municipal control, is well managed, and its example is one of the most potent arguments for municipal ownership of gas everywhere else.

Municipal Insurance.

THE Mayor of New Haven, Conn., has come out strongly in favor of Municipal Insurance. His Honor states that his city pays about $500,000 a year in insurance premiums for the city's buildings whilst the fire losses amount to only about $125,000, leaving an annual profit to the companies of close upon $375,000. If his Honor would go a little further and give the data for the last twenty years and from this find the percentage of actual fire losses, as compared with the premium payments over that period, he could then very safely advise his city to put at one side each year, in a separate municipal insurance fund, the average amount of difference, and thus build up an insurance safeguard that would always be available in case of any emergency. The saving for the coming score of years, based on his Honor's figures, would show that the city would accumulate no less a sum than the formidable one of $3,750,000. Insurance companies, as a rule, are of very little help to a municipality as far as its public buildings are concerned, and there is always some red-tapism and delay in the matter of settlement by the companies—San Francisco as an example. A municipality carrying its own insurance in this manner places itself on a strong footing. Let the Mayor put New Haven on a basis of this kind and thus set a practical example to all other cities. He will, of course, be sharply criticised by the insurance companies, but he can well afford to face this. What the country wants in these things is initiation. Philadelphia, Pa., is making an effort in a similar direction.

A New One on Them

IT is a natural characteristic to try and secure something for nothing, or the favor of a bargain. The payment of taxes is nearly always regarded as tiresome, if, indeed, not a thing to be avoided where possible. In New Jersey—in South Orange—a number of people recently went in person to protest to the Village Assessor, Mr. Frank Fenner, that their properties were assessed at too high figures. They, like the virgins with the lamps, gave various reasons and many excuses as to why the assessments should be reduced wholly, or at least in part. Some of these individuals, in their enthusiastic endeavors to obtain reductions, went so far as to state that they would be only too glad to get rid of their properties at prices much lower than what they were assessed at, Mr. Fenner, being a man, not only of business, but of humor, promptly pulled out a roll of bills as thick as a hitching post and offered to take any or all of the properties at the owners' own figures. It need hardly be said that he got no "sellers," and everybody paid up. The plan, though novel, appears to have worked well in South Orange and its adoption by other village assessors, similarly placed, will probably be only a matter of time. It has much to recommend it.

The Ice Difficulty

ON another page will be found a short article written as an outcome of a very extraordinary situation now existing in the ice supply world. All the way from one Portland to the other there are discontent and uneasiness regarding the supply, or irregularity of the supply, of this product. In New York City some one is advertising that ice can be easily manufactured for fifty cents a ton and is seeking capital to that end. The American Ice Company of Philadelphia, Pa., is in the throes of bankruptcy, while a trust in St. Louis, Mo., has put up the price one dollar a ton to the dealer. Mayor B. P. Codd, of Michigan City, Mich., is determined to give the people cheap ice by using the Park and Boulevard force to cut it. In Washington, D. C., the officials of the American Ice Company plead innocence to the charge of the violation of the Sherman law, and Chicago, Ill., manufacturers are charging high prices as a practical lesson in economics. In Toledo, O., the ice trust attorneys have escaped imprisonment, while Cincinnati, in the same State, has just been indicting three-quarters of a score of men for combining for restraint of trade. In Jacksonville, Fla., one man has gone to jail as a test case, and in Harrisburg, Pa.,

the people are organizing a co-operative corporation for its manufacture and sale. Great Neck, N. Y., is fighting the trust by the residents getting together and forming a company. Boston, Mass., is doing a probe, and Providence, R. I., Board of Trade is going to investigate the reasons why the price has doubled. Asbury Park, N. J., hotel keepers may make their own, and Plainfield, N. J., is in the throes of organizing a mutual benefit ice company, while Mt. Vernon, N. Y., has already gone ahead and is laying down a plant to make ice. Take it altogether, things are lively and it looks as though the people were not going to be quietly frozen out.

Practical Pictures

A DECIDED novelty has been introduced by the New York City Board of Health. In the various city parks and on the recreation piers throughout the metropolis are to be given moving picture shows, displaying short, pithy sentences, telling people how to deal with consumption, etc. The innovation is not at all a bad one, because the "show me" plan of distributing information has been proved to be successful in many other directions wherever it has been tried. The educational value of this unusual if not unique method of instruction cannot be overestimated, and although many a smile, and probably not a few sneers, will be indulged in by the unenthusiastic scoffer, the fact remains that the impression upon the eye is the most useful adjunct to any cause.

City's Reports

IF there is anything on the surface of the earth calculated to take the heart out of the ordinary Christian-minded editor it is the average report issued by a city. Most of these things are marvels of just what they should not be, while the rest of them, with few exceptions, are mere plaintive exhibitions of mediocrity in both arrangement and expression. As a rule they are badly printed with carelessly selected type on poor paper and are indifferently bound. No two are alike, in either idea or form, and as to any sense of collective unity of information, one might as well try and consult the bark scribbling of a Patagonian. These are, perhaps, strong words, but, unfortunately, they are fully deserved, as anyone who is compelled to frequently wade through the things, in order to get to know just what is meant by them, will testify. Of course every city has some different feature in it requiring some different treatment, but this should not prevent a general or central basis of uniformity. Accounts could be recorded in some easily understood standard manner so that they who run may readily read, while the reports of the various departments could be issued in an organized and acceptable sequence. It ought not to be difficult to get together a thoroughly representative congress or convention of city officials to set out and adopt a workable method which should be used the country over. Mr. Harvey S. Chase, of Boston, and Mr. F. D. Page, of Fitchburg, Mass., have both been laboring and still are, like Trojans, to get some plan of this kind taken up and worked out, and it does seem that something tangible should be the outcome. An adoption of the idea suggested would not interfere with the inclusion of the historical description of a place or a chapter or so on the advantages claimed for it or the insertion of any good illustrations, which are always appreciated. A welcome relief and a pleasant exception to this deplorable state of things are the monthly official reports of the Board of Health of the City of Memphis, Tenn. Those of January, February and March, respectively, now before us, are, in our opinion, models of what such things should be. Convenient in size, neatly typed on serviceable paper, they, in eight pages each, give a comprehensive and reliable survey and summary of the work of the department. Easy to read and quite as easy to assimilate, under less than a score of headings the whole health condition of the city is made as plain as a pike-staff. Whoever originated these reports deserves every credit for simple common horse sense, and we gladly give it to him, her or them. A report should be a matter of much pride, not only to those who make it, but to the city that issues it.

How to Do It

IT was the great Duke of Wellington who replied to an apparent blackmailing threat, "Publish and be damned." It is, however, not given to everyone to possess His Grace's courage or happy terseness of expression. Indiana apparently has backbone and has displayed very considerable of it lately in publishing, in extenso, the results of the investigations by the Indiana Health Board. Out of 889 articles examined, chiefly food products, no less than 389 of them were found to be adulterated. The Board describes them, states which they are and what they are adulterated with, giving not only their trademarks but the names and addresses of their makers, who are thus receiving an advertisement which they will probably not altogether appreciate. It is decidedly a step in the right direction. This "daylight" procedure of publishing the facts will do more as a deterrent than will threats or fines. The daily newspaper press can help us to beef without borax, coffee without chicory, pepper without peas, milk without mixture and our breakfast food without sawdust, much better than can any or all of the officials that were ever elected to prosecute offenders in these respects.

Enterprising San Francisco

THEY wanted a hotel in San Francisco and they wanted it—as the little boy said when he asked for ice-cream—"right now." And they got it. The St. Francis Hotel annex, though naturally a temporary structure, is one of the first hotels of the new city. It is fitted with all modern conveniences and is situated in the center of the Union Square Park. For the privilege of occupying this position, the company running the hotel will turn over to the city all the net profits accruing from operating it, such profits to be applied to the improvement of the Park. This is an interesting *quid pro quo,* and curiosity will be aroused as to what amount of cash returns for quenching thirsts, assuaging hunger and giving restful nights will reach in actual benefit to the city.

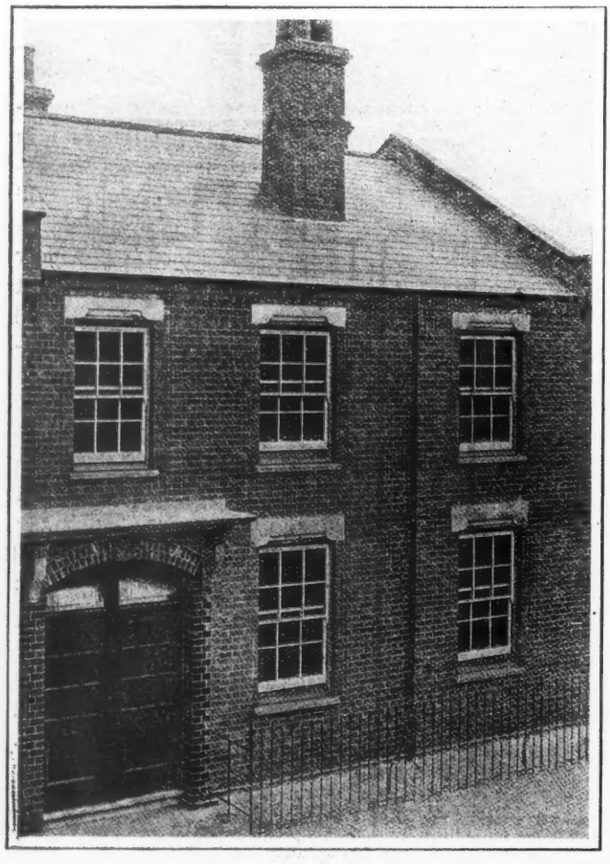
A FOUR-ROOM RESIDENCE FOR $2.50 A WEEK

Battersea, London, England, Shows What Can Be Done for the Workman—Sixty Cents a Week for a Room—An Example to American Municipalities

THE recent meeting of the Association of Municipal and County Engineers, held at Battersea, London, England, the constituency of the Right Honorable John Burns, M. P., the working man, President of the Local Government Board, was distinguished, among many other interesting and practical features, for the most attractive description of the housing artisan in that district, for the particulars of which we are indebted to *The London Surveyor, Municipal and County Engineer.* The article describes details and gives the cost of erection and maintenance, and is altogether a magnificent object lesson of what can be accomplished under proper conditions and survey. We should like to see a similar experiment tried in this country. Nothing appears to have been omitted from either a sanitary or home-like point of view.

ARTISANS' DWELLINGS, LATCHMERE ESTATE

The Latchmere estate originally formed part of what was then known as the "Latchmoor" Common, and was enclosed for allotments in 1835 by the church-wardens and overseers.



BATTERSEA, LONDON, ENGLAND—FOUR-ROOM TENEMENT, BURNS ROAD

The allotments were let to persons annually, the rents (amounting to about $80 per annum) being paid into the funds of the poor rate.

In 1890 the Board of Overseers asked the London County Council to make provision in their General Powers Bill enabling the board to erect artisans' dwellings on the land, and on November 8, 1899, the County Council acceded to the board's request. The bill was introduced in the House of Commons, and although it met with some opposition it was passed, and received the royal assent on August 6, 1900. The committee afterwards proceeded to prepare a scheme.

Plans, specifications and estimates for two or three-story dwellings of various types were submitted from time to time by the borough engineer for the development of the estate. Subsequently competitive designs were invited by advertisement, and premiums offered for the best sets of designs submitted. The borough engineer was then instructed to prepare revised plans based upon the first premiated designs, but omitting certain details which did not meet with the approval of the committee, and inserting a combined bath-room and scullery. Detailed plans, specifications and estimates were accordingly prepared and the work of erection proceeded with by the Works Department.

There are upon the estate 138 three-room tenements, 146 four-room tenements, twenty-eight five-room houses, one four-room house, and one three-room house, providing in all accommodation for 314 families. The four-room tenements are, for the most part, situated in Sheepcote lane, Burns road, Matthew street, West Side; Reform street and Freedom street, East Side; while the three-room tenements are in Joubert street, Odger street and Freedom street, West Side. The five-room houses are situated chiefly in Matthew street, East Side, and at the end of the rows in Joubert street, Odger street and Reform street. The plans show the arrangement of the several types of dwellings.

The four-room tenements in the cross-streets have a frontage of 26 ft. 9 in. and a depth of 28 ft. 9 in. The living-room measures 13 ft. 8½ in. by 11 ft., bath-room scullery 10 ft. 5 in. by 6 ft. 3 in., front bed-rooms 13 ft. 2 in. by 9 ft. 1½ in. and 10 ft. 6½ in. by 11 ft. 3 in., and back bed-room 15 ft. 7 in. by 7 ft. 3 in. The four-room tenements in Sheepcote lane, seventeen in number, have a frontage of 29 ft. 1 in., so that the rooms are considerably larger than those in the side streets. The houses containing three-room tenements have a frontage of 22 ft. 6 in., and a depth of 27 ft. 6 in. The living-room measures 10 ft. 6½ in. by 13 ft. 4 in., bath-room scullery 8 ft. 10 in. by 7 ft. 3 in., and each bed-room 15 ft. 1 in.

by 7 ft. 10 in. The five-room houses have a frontage of 18 ft., and a depth of 27 ft. 9 in. The living-room measures 15 ft. 4½ in. by 10 ft., bath-room scullery 12 ft. 1 in. by 6 ft. 6 in., parlor or bed-room 10 ft. 11 in. by 10 ft. 6 in., front bed-room 14 ft. 4 in. by 10 ft. 6 in., back bed-rooms 15 ft. 4½ in. by 8 ft. and 12 ft. 2½ in. by 9 ft. 10 in. The height of all rooms is 8 ft. 9 in. in the clear. The whole of the tenements and houses are fitted with kitchener, copper, bath and sink, and the tenements on the first floor are provided with teak staircases, giving access to the back gardens.

An interesting feature in the living-room and scullery bath-room is the "Model Cottager" combined kitchen range, copper and bath arrangements, which were manufactured and installed by Ellkay & Cornes, Limited.

The apparatus has been designed to secure the maximum of convenience as regards cooking, heating and washing with the exclusive use of a hot or cold bath at a minimum cost of fuel. It is fixed in the dividing wall between the living-room and the scullery bath-room. The heating and cooking part is fixed in the kitchen, the grate (open and close) being in the center with an oven on one side, and a boiler (which is accessible at the back) on the other. The boiler has a hinged lid, and there is therefore no risk of explosion; it has a capacity of 12 gallons of water, 10 gallons of which can be run off, the remainder being held in reserve. By manipulating a damper, the flames are diverted from the range to the copper, to heat the water to wash the clothes, or provide hot water for a bath which is adjacent to the copper in the scullery bath-room. The fuel thus performs a manifold service, thereby affecting considerable economy to the tenant. Should the range fire not be in use at any time, a secondary grate, which consumes a small amount of fuel, is provided under the copper. A distinct advantage is that heat is radiated from the back part of the apparatus, and the two rooms are thus kept at practically an even temperature, so that bathing may be indulged in with comfort in cold weather.

Each tenement has its own separate entrance and back garden, and the whole of the floors are fireproof throughout, being constructed of coke-breeze, cement concrete and steel joists.

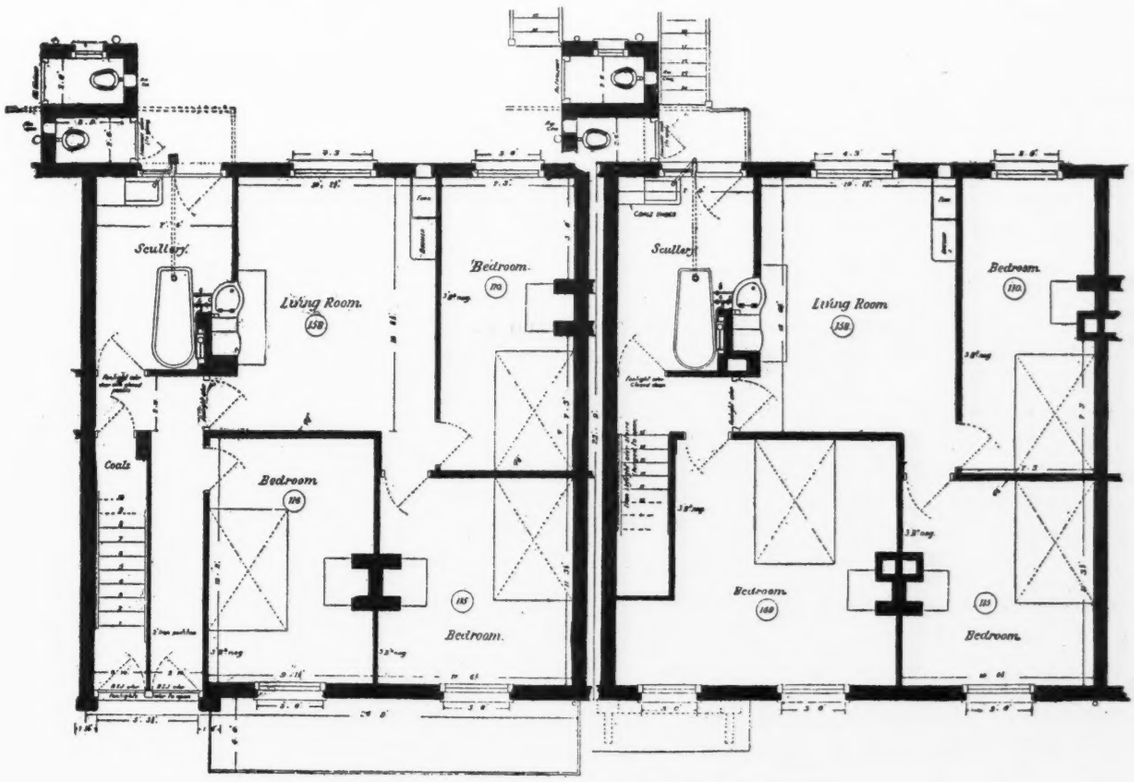
The houses are provided with electric-light fittings, and electrical energy is supplied on the penny-in-the-slot system.

The roads and streets also on the estate are lighted by electricity.

The paving of the estate, granolithic sills, heads, cantilevers, lintels, breeze partitions, etc., were made on the ground by the council's own workmen.

The rents of the various houses and tenements are as follows: Five-room houses, $2.87 per week; four four-room tenements to Sheepcote lane, $2.62; other four-room tenements, $2.50 per week; three-room tenements, $1.87 per week, which works out at 60 cents per room, exclusive of bath-room scullery.

The area of the land occupied by streets and buildings



BATTERSEA, LONDON, ENGLAND—PLAN OF FOUR-ROOM TENEMENT
Cost, 14 cents per foot; Rent, $2.50 per week.

is 7a. 3r. 2½p.; the remainder, 3a. 3r. 35p., being unbuilt upon, but it is hoped that before long a portion of this will be available for the erection of three-room tenements, the remaining portion being left as a recreation ground which is now being laid out.

The estate (although the buildings were not all completed at the time) was formally opened by the Right Honorable John Burns, M. P., who stated that, in his opinion, "by building this colony, Battersea had contributed more to meet the alleged decadence of physique than all the articles that had ever been written in the newspapers, and the result of their scheme was a tribute to the unity of Parliament with other bodies."

Artisans' Dwellings, Town Hall Estate

The scheme on the Latchmere estate proving so successful, the council, having regard to the great necessity which existed for further working-class houses in Battersea (915 applications in addition to those accommodated having been received at that time for the tenancy of the houses and tenements on the Latchmere estate) and to the fact that there was practically no other available housing land in the borough, decided to take the necessary steps to appropriate for such purposes certain surplus land at the rear of the town hall and municipal buildings, which had been used by the council chiefly as a depot.

Fourteen houses, each containing two three-room tenements, and four houses, each containing two two-room tenements, have been erected, accommodating in all thirty-six families. A new street in continuation of Town Hall road was also formed through a portion of the land. The plans, etc., show the arrangement of the several types of dwellings.

Most of the three-room tenements in Theater street have a frontage of 23 ft. 9 in. and a depth of 27 ft. 6 in. The living-rooms measure 14 ft. 7 in. by 10 ft. 7 in., bath-room scullery 8 ft. 9 in. by 7 ft. 3 in., and bedrooms 15 ft. by 8 ft. 9 in.

One bed-room to each first-floor tenement is slightly larger, and measures 15 ft. by 11 ft. 6 in., exclusive of space over staircase.

The two-room tenements in Theater street have a frontage of 17 ft. 6 in. and a depth of 29 ft., the living-room measuring 13 ft. 6 in. by 13 ft., bath-room scullery 13 ft. 6 in. by 6 ft. and bed-room 10 ft. 6 in. by 10 ft.

The three-room tenements in Town Hall road have a frontage of 23 ft. and a depth of 27 ft. 6 in., the living-room measuring 13 ft. 10 in. by 10 ft. 7 in., bath-room scullery 9 ft. by 7 ft. 3 in., and bed-rooms 13 ft. by 8 ft.

One bed-room to each first-floor tenement, as in Theater street, is slightly larger, and measures 15 ft. by 11 ft., exclusive of space over staircase.

The two-room tenements in the center of Town Hall road have a frontage of 26 ft. 6 in. and an average depth of 18 ft. This extra length of frontage has been necessitated owing to there being very little depth of land at the back of the Town Hall villas previously existing on the site.

The living-room measures 13 ft. 6 in. by 12 ft. 10 in., bath-room scullery 10 ft. by 6 ft., and bed-room 12 ft. 6 in. by 9 ft.

The height of all living-rooms and bed-rooms is 8 ft. 9 in. in the clear.

The tenements on the first floor are provided with teak staircases, giving access to the back gardens.

All the tenements on this estate, as on the Latchmere estate, are fitted with the Ellkay & Cornes combined range, copper and bath; the rents charged are $1.62 per week for two-room tenements, and $2.12 per week for three-room tenements.

The plans for the work were prepared by the borough engineer, and the work carried out by the council's Works Department.

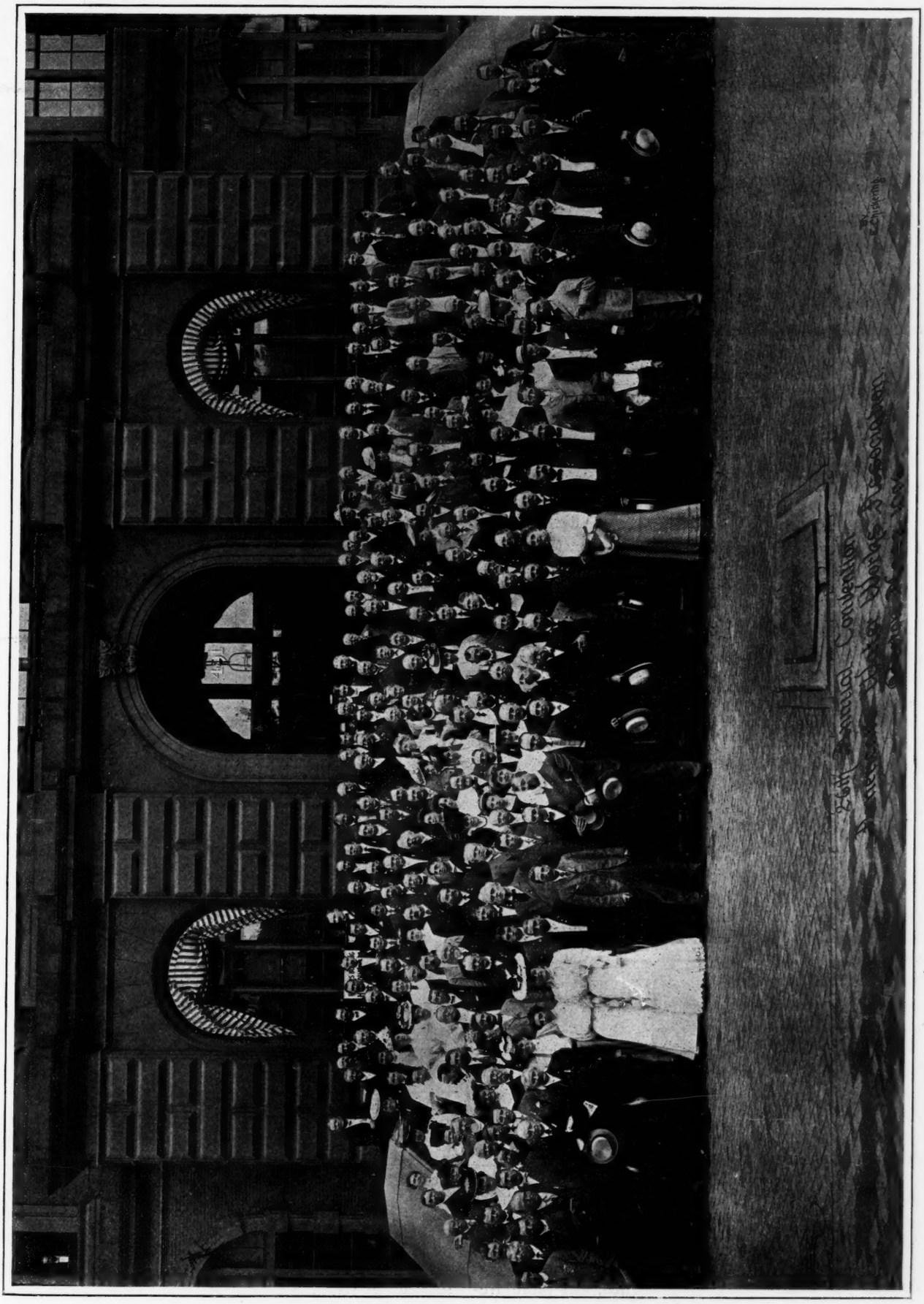
The estimated cost of the two estates, including the purchase of additional property, and the construction of roads, sewers, buildings, etc., amounted to $637,120. A considerable saving was effected on this estimate, the capital expenditure being $570,925, which amount included 5 per cent. for establishment charges. The actual cost of building per room, exclusive of bath-room scullery, is $370, but if the bath-room scullery, which has a superficial area of 75 ft., is counted as a room the cost would be $325 per room. The price per foot cube of the building works out at slightly over 14 cents. With the exception of the first year the estates have been self-supporting, and as the loan is paid off, and a consequent reduction in the interest, a substantial income will be derived. The deficit on the first year's working can hardly be considered as a loss, as it was owing to a portion of the estate not being completed and occupied for the whole twelve months.

The following statement will show the financial aspect of the two schemes:

	Year ending March, 1905.	1906.	*1907.
Expenditure:—			
Salary of superintendent	$455	$455	$455
Rates and taxes	7,335	8,310	8,680
Light and fuel for offices	25	50	50
Telephone, stationery, etc	125	150	150
Water, Town Hall estate	—	100	100
Water, Latchmere estate	300	300	300
Electric light	2,165	2,250	2,500
Repairs and maintenance	1,850	1,550	†2,700
Repayment and interest on loans	26,690	29,205	28,320
Cost of loans	60	—	—
	$39,005	$42,170	$43,255

*Estimated. †The item for repairs and maintenance has been increased for the year 1907.

	Year ending March, 1905.	1906.	*1907.
Income:—			
Rents	$36,120	$40,250	$40,500
Electric Light	2,240	2,535	2,800
Miscellaneous	60	50	50
	$38,420	$42,835	$43,350
*Estimated.	$585 (def.)	$665 (bal.)	$95 (bal.)



WILMINGTON, DEL., WATER SUPPLY

City Plant One of Oldest Under Municipal Ownership—Borough and Legislative Management—Success in Operation—Source of Supply and Treatment—Improvements Planned

By THEODORE A. LEISEN, Chief Engineer, Board of Water Works

IN Wilmington, Del., as in many of the other older cities of the country, the water supply was derived originally from a number of wells with wooden pumps, and the first movement for concerted action tending toward a general system took place in 1796, when the Borough Council appointed a committee "to inquire of the inhabitants of the Borough who own the pumps which stand in the streets, whether they will be willing to give them up to the Corporation, who will take care to have them kept in order."

This committee evidently fulfilled its mission, but four years later the growing importance of the borough demanded some better system, and another committee submitted a report and estimate for piping the water from a certain spring. The estimate was as follows:

	£	s.	d.
835 feet of Pump Logs (for mains).	57	8	½
Digging and Laying " ..	7	1	10½
Cistern to contain 30 Hhds.....	48	0	0
Total 112		9	11

Owing, probably, to the apparent extravagance of the estimate, the project failed to materialize, and no progress was made until 1804, when the "Wilmington Spring Water Company" was incorporated and continued to exist as a private company until 1810, when the plant was purchased by the borough. This marks the incipiency of the Wilmington Water Department under municipal ownership, and ranks it as one of the earliest of the municipal water plants of the country.

BOARD CREATED BY LEGISLATURE

The Department remained under the direct control of Council, and under the management of a Water Committee, until 1883, when the State Legislature, at the behest of a number of citizens of Wilmington, created the "Board of Water Commissioners," to which was intrusted the care and management of the Water Department, and improvement of the water supply system. This Board, under which the control of the Department still continues, consists of three members, the original ones having been named in the bill creating the commission, and their successors appointed by the Mayor, one member being appointed every two years, for a term of six years. The duties of the Board are legislative, the executive management being in the hands of the Chief Engineer.

Since the creation of the Commission, the affairs of the Department have been conducted on strictly business principles, with results eminently satisfactory to the large majority of the inhabitants of the city. Its efforts have been subjected to considerable criticism at times; occasionally the censure may have merited, but more frequently it was the carping animadversions of political antagonism.

Under the new régime the gross and surplus earnings of the Department systematically and steadily increased, and from being a burden of expense, it has become a source of considerable revenue to the city. During the nineteen years ending January 1, 1905, after paying for all expenses of maintenance, improvements, extensions, and interest, $775,162.37 of surplus revenue was turned into the coffers of the city treasury. The total receipts for the corresponding term were $3,018,545.50, and the expenditures for extension, permanent improvements, real estate, interest on bonds, and surplus paid over to Council, amounted to $2,250,944.24, and for all operating expenses $767,601.26. It will thus be seen that the surplus revenue for the period mentioned was greater than the total expense of operation.

SOURCE OF SUPPLY

The source of supply is Brandywine Creek, with a drainage area of 320 square miles, mostly in Pennsylvania. The water in its natural state is a good, soft water, free from any objectionable mineral matter, but owing to its drainage area embracing a fairly populous section of Chester County, Pa., including several towns of considerable size, the stream is highly contaminated with sewage.

The water powers along the stream have been fully developed, and the high values in which these water-rights have been held has militated against the efforts of the city to obtain its source of supply farther up the creek, at a higher elevation. There is a fall of 130 feet in the bed of the stream in the five miles above tide water, and a considerable saving in pumpage could be effected if advantage could be taken thereof, but the repeated efforts to do so have ended in failure.

The city is the owner of one-half of the water-rights in the stream from an elevation of 26.7 feet to tide water, thereby controlling one-half of the normal stream flow for power or other purposes. A race-way about a mile long conveys the water from the dam to the pumping station, whence it is pumped to the distributing reservoirs.

The main pumping station is equipped with one Corliss pump of ten million gallons capacity, one seven million gallon Worthington pump, and a water-power pump capable of a maximum pumpage of three million gallons. The water is pumped from here to Cool Spring Reservoir, at an elevation of 144 feet above city datum (tide water). This reservoir has a capacity of 38,000,000 gallons, and is used as a source of distribution and supply for the low service. A second pumping station at Cool Spring con-

taining two 3,000,000-gallon pumping engines, is utilized for raising the water to the high service reservoir at an elevation of 245 feet, and to the extreme high service of Rockford tower at 310 feet maximum elevation.

Consumption and Revenue

There are 117 feet of water mains in the city, varying from 3 inches to 30 inches in diameter, 51 per cent. of which is 8 inches and over. Gates are placed at every street intersection, so that with a few exceptions any block can be cut out without interfering with the supply in other sections. There are 867 fire hydrants and 16,311 services to dwellings, factories, etc.

The total average daily consumption for the year 1905 was 8,573,000 gallons, which, with an estimated population of 86,000, gives a per capita consumption of 99.6 gallons of which 48.8 per cent. was used by manufactories, and 51.2 per cent. was consumed by residences, schools, hotels, and for fire purposes, representing what may be termed domestic consumption. This makes the per capita consumption for domestic service 51 gallons, and in view of the large proportion of water used by manufacturing industries, the total rate is a very favorable showing, and is due largely to a judicious use of meters. All water supplied to factories, railroads, hotels, and saloons is furnished on meter measurement, and in addition about 2,400 dwellings are metered.

The revenues of the Department for the year 1905 amounted to $206,191.36, and the disbursements along the line of usual expenditures, including extensions and various other permanent improvements, $112,354.36. The balance, or $93,837.00, which under ordinary conditions would have been classified as surplus, and turned into the city treasury, was devoted to defraying the cost of the new water supply system.

As all water used for fire purposes, sprinkling streets and parks, flushing sewers, and for all schools, public buildings, and swimming pools, is furnished free of charge, the value of this service, which is estimated at $36,000, should be credited as additional surplus revenue.

Plans for Improvement

The question of improving the water supply system, both by increasing the capacity of the plant, and by filtering the supply, had agitated the Department for several years, and the first definite steps in the accomplishment of this object were inaugurated during the past year.

The plans which have been prepared by the writer provide for a general system capable of gradual extension, to supply eventually 40,000,000 gallons of filtered water per diem, with a total storage capacity for raw and filtered water of about one hundred million gallons.

Briefly, the work now contracted for and under way, includes the following: One pumping station with provisions for three vertical pumping engines whose combined capacity would be upwards of forty million gallons daily; two 12,000,000-gallon vertical triple expansion pumping engines now being built, to be erected during the course of the year, with space remaining for a third pumping engine, which may have a capacity of anywhere from twelve to twenty million gallons; two 300-horsepower Edgemore water-tube boilers; a 43-inch diameter forcing main to the new reservoir, and a 48-inch diameter distributing main from the reservoir to Cool Spring, connecting there with Cool Spring Reservoir, and the other distributing mains, and one 35,000,000-gallon storage or sedimentation reservoir on the Weldin Farm, known as the "William T. Porter" Reservoir.

Filters and Extensions

In addition to the work now under construction, detail plans are now on file, or are being prepared, for the following described works: A reinforced-concrete bridge of ornamental design, consisting of three 50-foot spans, and four 28-foot spans to carry the 48-inch distributing main across the Brandywine Creek at Van Buren street.

A preliminary filter with a daily capacity of 16,000,000 gallons is to be located near the new pumping station, through which the water from the race will pass before reaching the pumps. This filter is a modification of the Maignen system, and from the results obtained at the experimental laboratory, it is believed that it will remove from 60 to 80 per cent. of the turbidity, and a corresponding quantity of other impurities.

Slow sand filters are to be provided for the final purification of the water. These will be located adjacent to the new reservoir on the Weldin Farm. There will be eight covered filters having a combined filtering area of about three and one-half acres, and also one 10,000,000-gallon covered filtered water reservoir.

With the completion of the works enumerated above, Wilmington will have a water supply equal to the best in the country. The extensions which will become necessary can be carried on from time to time, as occasion demands, everything having been provided for such extensions up to the final limit of the plant.

PAVING IN ALEXANDRIA

Virginia City Spends $50,000 a Year to Improve Streets—Vitrified Brick Popular—Civic Pride Aroused and Better Conditions Result

Like most old cities, Alexandria, Va., was paved many years ago with cobble, and also, like most old cities, it seemed almost impossible to persuade the citizens that the cobble had long outserved its usefulness and more modern pavement was needed. There was violent opposition from the staid, conservative element for two reasons: first, the city was heavily bonded with old railroad and sewer bonds, the carrying of which was a burden that taxed its revenues heavily. There was over $800,000 of these bonds. Secondly, real estate was at a standstill; there was no market, and nothing by which to gauge values, so the property owner had to pay one-half the cost of paving; he felt it an added burden on his property with no increase in value. Finally, however, five years ago, the progressive element succeeded in getting one block in the business district paved with brick. It was no sooner laid than from all sides rose a clamor for paving. Real

estate began to take on an actual value, property along paved streets was in demand, and prices went up; also the assessed valuation, and the whole city is now converted to paving.

Unfortunately, through a recent change in laws by the Legislature, the city is obliged to pay the major portion of all new paving, viz., all intersections to the building line and one-half of the street. In other words, each property owner only pays half the cost in front of his property to the center of the street, or one-fourth the entire cost. Therefore the city is unable to go ahead as fast as it would like, owing to a lack of money. There is being expended, however, for this purpose about $50,000 per year, and the city is fast assuming a metropolitan aspect, for with clean, well-paved streets a civic pride is aroused. Almost invariably as soon as a street is paved one will note an effort on the part of the property owner to improve the appearance of his property to conform to the street.

SEVEN MILES OF STREETS

There are now about seven miles of the principal streets paved. The work has all been done by day labor under the charge of Emmett C. Dunn, City Engineer, and is an exceptionally fine piece of work. The material used is vitrified brick, made by the Mack Manufacturing Company, of New Cumberland, W. Va. They are laid with a 6-in. concrete base on an 1½-in. sand cushion and grouted with cement, the cost averaging $2.10 per square yard. The street is made with a 3-inch crown and expansion joints at curb line. The reason for this is that in the first street laid, where lateral expansion joints were used, the street disintegrated at the joints. Mr. Dunn's explanation is that the expansion from each side has literally crushed the brick in the joints, also there is an inclination always for one side of the joint to be higher than the other, causing the brick to break and shale off at the inequality. The balance of the street which has been laid five years shows absolutely no signs of wear and is evidently as firm and smooth as the day it was laid. The grout used is made of a very sharp sand, rather thin, and poured slowly until the crevices are thoroughly filled to overflowing.

BALTIMORE'S BIG FIRE

And How Washington Helped to Fight It—Hydrant Connections Easily Made—Chief Belt on District of Columbia Department

CHIEF WILLIAM T. BELT, of the Washington, D. C., Fire Department, in speaking of the fire which devastated a large part of Baltimore, Md., on February 7, 1904, causing a loss variously estimated at from $40,000,000 to $75,000,000, gave some interesting facts concerning the work of his own department in fighting the spread of the flames, and incidentally furnished information as to the size and equipment of Washington's fire-fighting force. "The five engines I took to Baltimore," said Chief Belt, "worked throughout the entire fire and threw better streams than I have seen them throw in Washington. This showed conclusively that no trouble was experienced in making connections with the Baltimore city fire hydrants, particularly as no time was lost in getting down to work.

"When I received a telegram from George W. Horton, Chief Engineer, Baltimore City Fire Department, requesting assistance from Washington, I immediately replied that I should go to his aid with all engines and equipment possible. At twelve o'clock noon I was loading engines at the platform in the Baltimore and Ohio Railroad Company's freight yard, the facilities for loading the apparatus being very poor. We left Washington on a special train, which was given the right of way, and arrived at Baltimore at 1.45 o'clock P.M. At 1.55 P.M. we were fighting the fire in what is called McClellan alley, in the rear of Liberty street, that being considered the fiercest point of the fire at that time. When this portion of the fire was gotten under control, I was requested to shift my force to Baltimore street. I did so, and got into position in front of the fire on Baltimore street, and fought the same with five engines, five wagons, and 125 men, until the time of the finish of the fire at Jones' Falls.

ENGINES MAKE CONNECTIONS

"As to the engines making connections with the fire hydrants, I would state that we had no trouble whatsoever, with the exception of one engine. With that engine I used a fifty-foot section of hose, connected to a fire hydrant, and forced the water into a barrel, the engine then taking suction from the barrel.

"The Fire Department of the District of Columbia consists of one Chief Engineer, one Deputy Chief Engineer, three Battalion Chief Engineers, one Fire Marshal, one Deputy Fire Marshal, three Inspectors for the Fire Marshal's Office, one Superintendent of Machinery, one Assistant Superintendent of Machinery, twenty-nine Captains, thirty Lieutenants, twenty engineers of steamers, twenty assistant engineers of steamers, three marine engineers, two assistant marine engineers, two pilots, thirty drivers, thirty assistant drivers, one hundred and sixty-eight privates of Class 2, thirty privates of Class 1, two clerks, one laborer. The equipment is as follows: Twenty engines, eight combination hose and chemical wagons, twelve hose reels, nine aerial trucks, one Champion water tower, one fire boat, three chemical engines, and three engines, three chemical engines, four hose wagons, and two trucks in reserve. All trucks are equipped with water tower pipes; four of the wagons are equipped with monitor pipes; and all hose wagons and hose carriages are equipped with cellar pipes.

"The area of the city is seventy square miles. The city has 7,000 brick, stone, cement, and frame buildings, 540 fire alarm stations, 2,800 fire hydrants. The Gamewell Fire Alarm System is used, with 'joker' and 'indicator.'

"During the year ended June 30, 1906, there occurred 980 fires, resulting in a loss of $177,788.00; insurance, $1,597,731.00. The number of bell alarms was 564; 'still' or local alarsm, 416."

THE DISPOSAL OF SEWAGE

Survey of an Important and Complicated Subject—Professor Roche on Various Systems—Chemical and Biological Treatment and Results—Intermittent Downward Filtration

By ANTONY ROCHE, M.R.C.P.I.,
Professor of Public Health, Catholic University Medical School Examiner, Royal University; Lecturer in Hygiene, Department of Agriculture and Technical Instruction of Ireland in the Royal College of Science, Dublin

In former times the disposal of sewage was easily settled, as it was generally run into the nearest river or ditch, This is not legal now, nor do I agree with those who hold that if the volume of the water in a river is fourteen times greater than that of the sewage this may safely be done. We have no security that the water will not be used for drinking, and though dilution will lessen any nuisance it might create, it will not remove the danger of infection of the water by disease producing germs, which the sewage may at any time contain. I will give a brief outline of the following systems: (1) Discharge into sea; (2) Cesspool; (3) Chemical systems; (4) Broad irrigation; (5) Intermittent downward filtration; (6) Biological systems.

Discharge Into the Sea—This is obviously applicable only in seaside towns—even in these the greatest care is required in the study of the currents, so that the sewage may not be deposited on neighboring shores. The exit sewer should extend out a considerable distance, be protected by a flap valve and the sewage should only be delivered during the ebb-tide—during the flow, being collected in a covered tank.

The Cesspool is obviously only applicable in country houses and in such places where no other method is available. The cesspool is made of stones lined with concrete or of concrete; it should be as remote from house and water supply as possible, the usual distance recommended, 100 feet from well. I consider this too close; it should be covered, ventilated, with part of the roof removable for cleansing, the drain of the house should be intercepted on the same principle as in towns with the water carriage system. In many large country mansions at the present time, in place of the old cesspool some form of the biological method, subsequently explained, is being introduced. This is a great improvement, but naturally requires some looking after.

Chemical Systems—In the chemical treatment of sewage various chemicals are added to it in the tank for the purpose of either causing more rapid precipitation of the suspended particles or to render it less offensive. The system is open to both theoretical and practical objections. The chemicals retard the growth and action of the microorganisms which are the chief factors in breaking down the organic matter and in practice, though the resultant fluid (the effluent) may be less offensive for the time, it frequently undergoes a secondary decomposition that leaves it little, if at all, better than its primary condition. Then there is the element of expense. I consider it is only a matter of time when this method will be entirely put aside. When used the sewage is generally passed into tanks and there the chemicals mixed with it. Many have been proposed and used—perhaps the most common is lime from five to thirteen grs. per gallon or a mixture of lime and some salt of iron, alum, blood and clay (or what is know as the A, B, C method), permanganate of soda, herring-brine and no end of others. I will not trouble you with any more, as I regard the whole system as bad. One of the great difficulties in connection with it is the disposal of the material which has been precipitated, technically called "sludge." It has to be deprived of some of its moisture by pressure in machines, constructed for this purpose—when so formed into cakes it has been offered for sale to the neighboring farmers as manure, but as much of its nitrogenous matter has disappeared, sale for it is difficult to obtain, so in many cases it is given away.

Broad Irrigation.—The sewage under this plan is run upon land which has previously been prepared by putting drain pipes some six feet from the surface to catch the effluent—on the land various crops have been grown. The system requires a large amount of land to be available as only the sewage of 100 persons to the acre can generally be dealt with. It is only under exceptional circumstances so much land is avaliable near a city. If, however, it can be obtained and the system is carefully worked, so as not to apply too much sewage, large crops can be raised. I have personally noticed, however, that the smell near such sewage farms is anything but pleasant and cannot be healthy. The system has, to a great extent, been replaced by the Intermittent Downward Filtration.

The Intermittent Downward Filtration—For this system a loamy or combined loamy and sandy soil is best; there must be a fall, and ordinary agricultural drain pipes are laid about six feet from the surface and four to six feet apart; these pipes collect the effluent, and are eventually connected. The surface of the soil is deeply ridged. The selected plot is divided into four sections. The sewage is conducted into one for six hours. Then into the second for six, and so on. In this way it does six hours work and has eighteen hours rest for aëration. On the top of the ridge Italian rye grass can be grown; it has been proposed to use it for vegetables, but I think this would not be prudent. The amount of sewage per acre this system can treat depends greatly on the case in which it is worked—the estimate is from 1,000 to 3,000 persons. The land acts mechanically as a filter—

chemically, to some extent, by oxidation by the air it holds, but mainly biologically, as the upper four feet of the soil contain great multitudes of nitrifying micro-organisms which convert the organic matter into nitrites and by further oxidation into nitrates.

GOOD RESULTS FROM SYSTEM

It has been objected to this system that it would create a nuisance, be dangerous to the men engaged and spread infectious diseases. Experience has shown that if suitable land is obtained and the system laid down and carried out efficiently no such bad results follow; in fact, this is one of the very best systems when judiciously worked.

Biological Systems—When it was understood that the chief agency in the earth treatment was the micro-organisms in it, naturally the idea of cultivating these apart suggested itself and thus the so-called "biological" system, pure and simple, was investigated and in many cases adopted. There are many modifications of it. I will describe, shortly, some of them. It will be understood that in this and all cases where organisms change organic matter into simpler chemical compounds it is not one nor one class of these organisms that produces these changes. There are many engaged—one liquified and so advances the process, the change is then taken up by others and so on. This liquefaction was, by some, considered to be mainly the work of organisms that work best in the absence of oxygen or air and the further changes were produced by nitrifying or oxidizing organisms that work best in the presence of air or oxygen—probably there is no such strict division. In the Moncrieff system the sewage first passed a rough screen which excluded very large particles; it then passed from below up through a sand filter. The fluid is then let fall through a number of trays with air intervals, so that the sewage is thoroughly aërated. This system has not been used to any extent.

In the septic tank, Cameron or Exeter system, the sewage first passed through a grit chamber where all mineral deposits are caught; it then passes through a closed tank taking twenty-four hours in its progress from the tank. The sewage, now liquified, is distributed on beds.

TANK NOT ESSENTIAL

The tank is not essential. The sewage after screening can be distributed on one, two or three series of beds made about six feet in depth of stones, clinker coke—in some cases the sewage is applied more or less constantly, in others, the "contact" system, the sewage is only let remain in beds some hours of the day; in the interval the beds become aërated. In most cases now the sewage is applied on the beds by a sprinkler revolving on a central pivot, which insures uniform distribution and aëration of the sewage. Many special arrangements have been introduced to meet the special character of the sewage; in all, it is essential that the beds be laid down well in the first instance, that they be worked by competent men, and not called upon to do too much so as to get choked. All beds take some time to settle down so at first they should not be called upon to do too much, in other words too much sewage should not be sent on them.

The effluent is generally remarkably clear and does not undergo secondary decomposition, but the evidence so far produced goes to show that any disease producing micro-organisms are not removed, so the effluent could not be allowed into water used subsequently as a drinking supply. The English Local Government Board still requires that the effluent should be passed through land subsequent to the tank and bed. No doubt improvements will in the future be introduced, but I have no doubt that as the system is based on that adopted by nature it is the true one and has come to stay.

Recently the tank has been abolished in some systems and the sewage is passed continuously or intermittently in the "contact" system, on and through one, two or three beds. The beds may be made of rounded stones or clinker from destructor, breeze from gas works, or similar material. The beds are generally about six feet in depth and have sides and floors of concrete, in some cases no sides. The germs grow on these materials and produce the necessary dangers in the sewage. The effluent is clear but swarms with micro-organisms and so cannot be safely run into water that may be used for drinking purposes.

THE MODEL CHIEF

Should Enforce Discipline and Improve Police Service—Jersey City's Superintendent on Duties and Responsibilities—School of Instruction

By BENJAMIN MURPHY, Chief of Police, Jersey City, N. J.

CONDITIONS in each city have a weighty bearing on the minds of the people as to how their police affairs should be administered. I would much prefer to know what some one else would have to say as to their ideas of the kind of a man a model Chief of Police should be, because, of course, I can but give my own opinion as to the qualifications, character and general make-up of a man best fitted to be a police commander.

Personally, I believe a police commander must be peculiarly constituted to be a success. He, in the first place, must be a healthy man because of the arduous duties, both mental and physical, he has to perform. He should be properly trained in all the powers and duties of a policeman before he essays the rôle of teacher, and must have an intelligent knowledge of the criminal laws, and the corporation ordinances of his city, so he may recognize crime and violations of municipal regulations at a glance. He should enforce rigid discipline in such manner that his subordinates would know that orders were issued to be obeyed. He should have his men neatly and properly uniformed and teach them the importance of caring for their personal appearance when upon the streets and public places. He should see that a manual or book of rules is compiled, containing extracts from

the criminal laws, city ordinances, health rules and all sorts of information to enlighten policemen on their duties.

School of Instruction

A school of instruction should be established for the enlightenment of new policemen before sending them on the streets. He should cause his officers and men to be drilled in army tactics to the extent necessary to be maneuvered in squads, companies and battalions, in case of riots or for the proper handling of large crowds.

He should listen attentively to all complaints from his citizens and use his best endeavors to satisfy them, thereby cultivating the friendship of the people, without whose support he cannot be a success. He should wage constant war on the criminal classes, never forgetting they are the enemy of society, and that the only safe place for the habitual criminal is in jail.

Far and above all I have said that goes to make up a model Chief of Police, one who comes near to be ideal, is the Chief who considers the *prevention* of crime his principal duty. To this end the police should be constantly reminded that the successful patrolman is the one who answers return roll call with the proud conscience that no crime was committed on his post during his tour of duty.

What a change for the better has been accomplished in the police service all over the country in the past ten years. Prior to that time the police in nearly all cities were but little better than political clubs, going in and out at each change of government; now, I am pleased to say, the police are generally protected in their office by law and can only be removed for wrong doing. In the city I have the honor to represent we have been free from removal from office except on conviction of some offense, for nearly twenty years. To the credit of the political parties of our State I am proud to say no attempt has been made to take this life tenure of office from the statute books.

SCHOOL GARDENING

As a Help to Education and Observation—Taught in Many Institutions—Modern Agricultural Methods—Health an Important Factor

By H. D. HEMENWAY,
Director of the School of Horticulture, Hartford, Conn.

In America, garden work and elementary agriculture as a means of education has been successfully demonstrated for nearly a score of years. Many of its enthusiastic advocates believe it has already passed its experimental stage, and should be included in the curriculum of every well-organized school. On the other hand, there are conservative educators who still look upon it as a fad. Many others, probably the larger number, believe in it, but for the lack of efficient teachers, and equipment, hesitate to advocate introducing the School Garden.

Several institutions in the country have already begun to train teachers, and the School Garden movement is making rapid progress. The time is not far distant when practical, elementary agriculture and gardening will be taught in many schools. It develops the children physically as well as mentally and, in the open air, often creates a love for things which keep the city boy off the street corners during the summer, and teaches the country child the business-like, up-to-date methods in agriculture and gardening.

It not only educates the head, the heart and the hand, but it aids in the practical application of reading, writing and arithmetic. Gardening increases and develops the power of observation. It makes a person quick to grasp ideas and to put these ideas into action. These are important foundations for success in any line of business.

Gardening and Manual Training

Gardening is one of the best kinds of manual training. If correctly taught it develops a keen power of observation, much accuracy in measuring, and takes the child away from the often too poorly ventilated schoolroom into the open air and sunshine. The garden may be considered an outdoor classroom or a laboratory, and in it may be worked out many problems. The garden takes away the drudgery of school life. Here the reasons for many studies are shown in practical form. The children learn to grasp more readily the lessons taught in the classroom.

Some teachers hesitate to introduce the School Garden for fear they cannot go through all of their other work. There are now School Gardens in some form in about one hundred and fifty towns and cities in the United States, and in no case where the Garden has been carefully, prudently, and intelligently conducted has it interfered with the regular school work.

On the other hand, it has greatly helped it. Boys and girls having gardens have been found to be more rapid in mental, physical and moral development than those not having gardens. A garden suitable for a city school would not generally be adapted to a country school, and yet the latter needs the garden nearly, if not quite as much, as the former, but not for all the same reasons.

Establishing a School Garden may change the entire healthfulness of a neighborhood. The school grounds themselves may be better planned and more healthful, but the best effect may be at the homes. The School Gardener soon wants a garden at home. No matter how small the yard, there is room for a garden for the boy or girl, *even if it has to be established in a soap-box.* There is much waste room often used for ashes, tin cans, or rubbish in many yards. What was once unsightly, unsanitary and unproductive, becomes a resort of beauty, of health and utility for a whole family. It opens up a source of revenue, creates a love of industry, and respect for property, and is often the beginning of better things. The gardener becomes a better American citizen.

ELECTROLYSIS AND GAS MAINS

Condensed from an Article written by M. R. BUMP, Denver, Col.

On the fundamental theory of the electrolytic cell much has already been written. The present theory of the electrolytic cell is the development of an hypothesis set forth by Clausius in 1857. When a salt is dissolved in water and the slightest electric current is passed through the solution, some of the molecules of the salt are broken up to form ions, which are atoms, or groups of atoms, which form the basic and acid components of the salt. The simplest example is common salt, which breaks up into two ions, one of which is the basic ion and is a single atom of sodium, and the other is the acid ion and is a single atom of chlorine.

If an electric current is passed through a salt solution, the basic or metallic ions become charged with a positive charge of electricity and tend to move toward the negative electrode and discharge their electricity upon it. As soon as they are discharged, the ions become free chemical atoms and plate themselves upon the electrode as a metallic deposit, this action being commonly taken advantage of in the electro-plating industry.

The acid ions in the solution become charged with a negative charge of electricity and tend to move toward the positive electrode of the cell and to discharge upon it. When discharged they likewise become chemically free and active, and if the electrode is a metal that forms a salt with the acid ions, thus freed, the electrode will be broken down to form that salt and will thus be carried off into the solution. It is this latter reaction that usually takes place when an iron pipe is corroded and destroyed by the acid ions in the earth surrounding the pipe.

There are two general laws which govern the amount of electrolytic action, and with these laws the effect can be determined for any particular case. These fundamental laws are as follows:—

1. When an electric current is passed through an electrolyte, the quantity of the liquid decomposed, *e.g.* the amount of electrolytic action, depends upon the amount of electricity, measured in coulombs, which passes through the electrolyte and is independent of the size of the electrode and of the electric pressure applied.

2. When equal quantities of electricity are passed through different electrolytes, equivalent quantities of the electrolytes are decomposed, *e.g.* a coulomb of electricity will decompose a certain amount of a chloride solution and a different but equivalent amount of a sulphate solution, and these amounts always bear a definite relation to each other.

The first law states that the amount of electrolytic action is independent of the pressure applied. Here is where many mistakes have been made by gas men who have expected to find the greatest electrolytic action where the voltmeter showed the greatest reading between the rail and the pipe. The customary pressure charts of our cities have for this and other reasons very little value except to define the bounds of the so-called "negative" area. The fact that the drop from the pipe to the rail is large, indicates that the earth at that point is a very poor conductor of electricity and that the current flow between the two is small. Often the greatest amount of corrosion is found at points where the difference of potential is almost too small to determine, being only one or two milli-volts.

The first law makes it plain that one ampere of current flowing from a pipe will destroy a certain definite amount of iron, whether the pipe is two inches or sixty inches in diameter, provided the pipe is in the same quality of earth.

The second law relating to quantities decomposed is stated in a reverse manner from that desired for use of gas men. A given quantity of electricity will decompose a certain amount of iron, if ferric or the higher salts are formed, and another definite amount if ferrous salts are formed, regardless of whether the electrolyte is a chloride sulphate or any other acid. Metals like iron that form two series of salts, possess this quality. For others that form only one series of salts, there is always but one quantity decomposed by a given amount of electricity.

Damage to Pipes

It has been generally supposed and accepted that damage to a pipe occurs only where current leaves the pipe, and in general this statement is practically correct. I am informed by Professor Burgess that it has been proven that in some cases current entering a pipe has caused an acceleration of the corroding action on the pipe. An explanation of this action may be found in the fact that pipes subject to the natural corroding influence of the surrounding earth become covered with a deposit that protects the pipe from further corrosion. When a current enters the pipe it may destroy the covering thus formed and leave the pipe subject to further corrosion from the surrounding earths.

At the present time a new factor is entering into the problem and one that happily offers relief to a large degree from the damages caused by electrolysis. I refer to alternating current traction. This new system is giving to the electric traction industry a new impetus, which up to the present time has been confined largely to interurban and long distance lines, but which is destined to come into use in our large cities as soon as proven practicable on the longer lines, and there seems to be no reason to doubt the practicability of the system. It is a well-known and established fact that an alternating current does not cause electrolysis to nearly as great an extent as does direct current. In fact, it is often stated that the alternation of the direction of flow will entirely stop electrolytic action. On this point, however, there seems to be some question.

In view of certain court decisions that the railway companies can be compelled to provide that system which is considered best modern practice, it would seem that the interest of gas companies should be enlisted in an endeavor to prove that the new system is the best modern practice, and I am confident that within ten years it will be regarded as such.

WHAT IT COSTS TO DO THINGS

Salt Lake City, Utah, Lays Macadam Pavements—How Do Prices Compare with Cost in Other Western and Eastern Cities—Bids Opened by L. C. Kelsey, City Engineer

Abstract of Bids for Macadam Pavement on First Street, from A to J Street, July 2, 1906

Work and Material	*Quantities*	*P. J. Moran Price*	*P. J. Moran Amounts*	*Hanley & Ritchie Price*	*Hanley & Ritchie Amounts*
Grading: Excavation	10,000 cu. yds.	$0.55	$5,500.00	$0.50	$5,000.00
Cement Curbing, steel reinforced, 6″ x 12″, incl. 30″ cement gutter	150 lin. ft.	1.20	180.00	2.00	300.00
Cement Curbing, 6″ x 18″, curved to special radii	350 "	1.10	385.00	1.10	385.00
Cement Curbing, plain, 6″ x 18″	400 "	.70	280.00	.70	280.00
Cement Curbing, 6″ x″18″, including 30″ cement gutter	6,000 "	1.05	6,300.00	1.60	9,600.00
Cement Curbing, 6″ x 18″, curved to special radii	260 "	1.00	260.00	.90	234.00
Cement Gutter, along curb, 30″ wide, including foundation	800 "	.60	480.00	.70	560.00
Paving, with Macadam	15,000 sq. yds.	.65	9,750.00	.75	11,250.00
Paving, with Sandstone Blocks, including foundation	120 "	3.00	360.00	2.40	288.00
Cement Sidewalk Intersections, 4″ thick	1,200 sq ft.	.16	192.00	.15	192.00
Waterways: Furnishing and laying 12″ Vitrified Pipe	200 lin. ft.	.65	130.00	.90	180.00
Waterways: Furnishing and laying 10″ Vitrified Pipe	1,600 "	.55	880.00	.80	1,280.00
Waterways: Furnishing and laying 8″ Vitrified Pipe	100 "	.40	40.00	.65	65.00
Waterways: Furnishing and laying 6″ Vitrified Pipe	450 "	.30	135.00	.50	225.00
Waterways: Furnishing and laying 4″ Vitrified Pipe	200 "	.26	52.00	.40	80.00
Storm Water Inlets, complete as shown on plan	18	22.00	396.00	28.00	504.00
Storm Water Outlets, complete as shown on plan	1	25.00	25.00	28.00	28.00
Diverting Boxes complete as shown on plan	9	17.00	153.00	25.00	225.00
Resetting manhole and valve box covers	9	6.00	54.00	3.00	27.00
Furnishing and setting 4″ x 10″ guard timbers	100 lin. ft.	.20	20.00	.20	20.00
Removing trees, 6″ or less in diameter	1	2.50	2.50	3.00	3.00
Removing trees, greater than 6″ and less than 1′ in diameter	1	5.00	5.00	4.00	4.00
Removing trees 1′ and over in diameter	1	7.50	7.50	5.00	5.00
Total			$25,587.00		$30,735.00

Abstract of Bids for Macadam Pavement on Second Street, from Canyon Road to West Street, and C Street from South Temple to Second Street.

		360 days		200 days	
Work and Material	*Quantities*	*P. J. Moran Price*	*P. J. Moran Amounts*	*Hanley & Ritchie Price*	*Hanley & Ritchie Amounts*
Grading: Excavation	33,000 cu. yds.	$0.55	$18,150.00	$0.50	$16,500.00
Cement Curbing, steel reinforced, 6″ x 18″, including 30″ cement gutter.	400 lin. ft.	1.20	480.00	2.00	800.00
Cement Curbing, 6″ x 18″, curved to special radii	850 "	1.10	935.00	1.10	935.00
Cement Curbing, plain, 6″ x 18″	2,000 "	.70	1,400.00	.70	1,400.00
Cement Curbing, 6″ x 18″, including 30″ cement gutter	18,550 "	1.05	19,477.50	1.60	29,680.00
Cement Curbing, 6″ x 18″, curved to special radii	700 "	1.00	700.00	.90	630.00
Cement Gutter along curb, 30″ wide, including foundation	2,000 "	.60	1,200.00	.70	1,400.00
Paving, with Macadam	47,000 sq yds.	.65	30,550.00	.77	36,190.00
Paving, with Sandstone Blocks, including foundation	300 "	3.00	900.00	2.40	720.00
Cement Sidewalk Intersections, 4″ thick	7,000 sq. ft.	.10	1,120.00	.16	1,120.00
Waterways: Furnishing and laying 12″ Vitrified Pipe	350 lin. ft.	.65	227.50	.90	315.00
Waterways: Furnishing and laying 10″ Vitrified Pipe	3,500 "	.55	1,925	.80	2,800.00
Waterways: Furnishing and laying 8″ Vitrified Pipe	175 "	.40	70.00	.65	113.75
Waterways: Furnishing and laying 6″ Vitrified Pipe	1,000 "	.30	300.00	.50	500.00
Waterways: Furnishing and laying 4″ Vitrified Pipe	500 "	.26	130.00	.40	200.00
Storm Water Inlets, complete as shown on plan	46	22.00	1,012.00	28.00	1,288.00
Storm Water Outlets, complete as shown on plan	4	25.00	100.00	28.00	112.00
Diverting Boxes, complete as shown on plan	23	17.00	391.00	25.00	575.00
Resetting manhole and valve box covers	16	6.00	96.00	3.00	48.00
Furnishing and setting 4″ x 10″ guard timbers	100 lin. ft.	.20	20.00	.20	20.00
Removing Trees, 6″ or less in diameter	1	2.50	2.50	3.00	3.00
Removing Trees, greater than 6″ and less than 1′ in diameter	1	5.00	5.00	4.00	4.00
Removing Trees, 1′ and over in diameter	1	7.50	7.50	5.00	5.00
Total			$79,199.00		$95,358.75

Comment—The difference which is made by each bidder in the price of plain and steel reinforced 6 x 18 concrete curbing is interesting. The difference in one bid is 50 cents and in the other $1.30. It might be questioned whether the reinforced is worth twice the price of plain curbing. Hanley & Ritchie bid two cents a yard higher for macadam on one street than on the other, making an allowance for difference in haul, while the successful bidder was willing to take his chances at the same price. It looks as though P. J. Moran had an advantage in the cost of his crushed stone, or had a better organized gang. The price for sandstone block would be considered high in most cities, but the amount is too small to bring out low bids. Only an intimate knowledge of the nature of the soil and the labor available would make it possible to comment on the difference in price of vitrified pipe, great as is that difference. The cost of storm water inlets is an important item in the cost of one of the streets, but these castings vary so much in different cities that little can be said about this element in the cost.

Metropolitan Items.—The suppositon that there will be planned city playgrounds on gas tank sites has proved to be ill grounded. The gas trust has changed its mind. The Secretary of the Consolidated Gas Company recently stated that the present outstanding capital stock of the company was $80,000,000, with power to issue $100,000,000. Query: What is the actual cost of its property? The value of the company's mains is estimated at $12,636,850 and the service pipes at $1,000,000. The company intends to use the old gas plants at 18th, 63d, 65th, 111th and 132d streets and at Inwood for distributing purpose.

The bond issue of $12,500,000 has fallen flat. The bids were low and Comptroller Metz is chagrined at the unsatisfactory results.

The city is being criticised for its method of accountancy. It is claimed that reform is necessary, a simpler and more reliable system is needed, more intelligent report required, and that there lies a great opportunity for improvement.

It is reported that within a few days an eminent Brooklyn lawyer will be arrested for making fraudulent sewer damage claims against the city. His name is not given.

The acting Mayor has disapproved of the plan to prevent wholesale unloading on Bellevue Hospital. There is no legal authority, he says, for the passing of a resolution of this character by the Board of Aldermen. Another objectionable feature of the resolution is the omission of any change exempting a crowded hospital from compliance with the provisions of the ordinances.

Governor Higgins won't consider the recent charges made by Mr. William M. Amory against the District Attorney, on the grounds that they are not specific and definite. Mr. Amory says he will make them specific and definite all right later on.

Magistrate Connorton wants the Long Island Railroad principals arrested for violating the smoke laws. He advises the police to arrest the president and some of the directors—not the employees who are compelled to obey orders.

Borough President Bird S. Coler, of Brooklyn, states that there is not going to be any more water famine scares in that Borough and that within a few months the increase from the driven wells on Long Island will reach 50,000,000 gallons a day.

Comptroller Metz is going to probe the various pavement claims against the city by organizing a bureau to investigate the claims as they are brought. Within a radius of a stone's throw of Madison Square there are holes large and numerous enough to keep a whole stack of enterprising claim lawyers busy enough for months to come. Let the comptroller organize a bureau to keep the streets properly repaired and the city will thus prevent actions and save money.

"Economist" writes to the New York *Herald,* asking, "Why continue asphalt?" and draws attention to the unsatisfactory condition of things on Broadway and Sixth avenue, comparing these thoroughfares to bumpity-bumps. It may not be the fault of the asphalt itself, Mr. Economist.

Mr. Theodore E. Blake, a member of the firm of Carrère & Hastings, Architects of the new Public Library, has been injured by a piece of falling marble which struck him upon the head.

Vigorous protests are being made by the citizens of New York as to the unpleasant color and great density of the water supplied to them. They complain that it resembles coffee in appearance and is nearly thick enough to be eaten with an ice-cream spoon.

Personals

GOGGINS, R. B., of Grand Rapids, Wis., has been appointed by Judge O'Neill as the fifth arbitrator to appraise the water plant at Eau Claire, with a view to its purchase by the city.

HARWOOD, FRANK J., Alderman and President of the Council of Appleton, Wis., celebrated his advent as Acting Mayor, when Mayor Hammel was called out of town, by clapping the lid on the ninety saloons.

HAWES, EDWARD, Jr., of Florence, S. C., who has been associated with Frederic Marshall, Consulting Engineer, of Abbeville, S. C., as principal Assistant Engineer, has been elected City Engineer of Orangeburg, S. C.

HAZLETON, HUGH, an electrical engineer of New York City, has been engaged to advise the City Council of Alexandria, Va., as to bids received for the purchase of the electric-light plant and power franchise, and has held conferences with the joint Committee on Finance, Light and General Laws.

HOPKINS, DR. E. GUY, of Fredericksburg, Va., has been elected Bacteriologist of Richmond, by the Health Board of the Virginia capital.

HORAN, JAMES, has been promoted from First Assistant Chief to the head of the Fire Department of Chicago, Ill., vice John Campion, recently removed by Mayor Dunne. Ex-Chief Campion will draw $3,000 pension per annum for life.

HORNUNG, GEORGE, of Cincinnati, Ohio, Consulting Engineer, has reported in favor of a sand bed filtration plan for the new water supply for Portsmouth, Ohio. The Commission will expend $2,500 to defray the expense of a thorough test.

HUEBNER, J. JR., Chairman of the Council Finance Committee, will head a party of Toledo, Ohio, officials, which will make a tour with a view to establishing a garbage incinerator in the city.

KENNEDY, WILLIAM, Chief of the Green Bay, Wis., Fire Department, has been removed from command, and Assistant Chief John Sweeney promoted.

KIERSTAD, W., of Kansas City, Mo., has been engaged by the City Council of Council Bluffs, Iowa, to make an estimate on a new waterworks plant.

MCKAY, JOHN W., has been appointed Acting Chief Engineer for the Department of Water Supply, Gas and Electricity, in Brooklyn, N. Y., which place has been vacant for several years. He will have entire charge of the water supply of the Borough, under Deputy Commissioner Cozier.

MICHAEL, A. D., of Ludington, Mich., has prepared plans and specifications for a system of waterworks for Kinsley, Mich., bids for the construction of which will be opened August 2.

O'BRIEN, COL. RICHARD A., James R. Quinter and Patrick G. Brick, have been appointed members of the newly-organized Plumbing Board of the District by the Commissioners.

O'CONNELL, DANIEL T., Secretary to Mayor John F. Fitzgerald, of Boston, Mass., tendered his resignation recently to take effect August 1.

RIETMEYER, PHILIP, Park Commissioner of Detroit, Mich., and M. P. Hurlbut, Secretary of the Commission, were entertained by Superintendent of Parks Wirth, of Minneapolis, Minn., recently, and they expressed admiration for the natural beauties of the country and predicted high fame for the parks of Minneapolis.

STRACHAN, C. E., of London, formerly associated with James Mansergh, has been engaged by City Engineer Rust, of Toronto, Canada, who is now in London, to examine and report on Toronto's plans for a sewage system.

WRIGHTER, H. C., has been reelected City Engineer of Lewiston, Idaho, for a third term.

Some Unusual Fires

HOT SPRINGS, S. D.—The first business building ever built in the town burned, July 23. Cause unknown. Amount of damage, $2,000.

CALGARY, CANADA.—P. Burns abattoir burned, July 20. Cause unknown. Amount of damage, $3,000.

FOUNTAIN CITY, WIS.—Business block, residences, warehouses and shops burned, July 23. Cause unknown. Amount of damage, $100,000.

HOPE, IDAHO.—The town was burned up, July 15. Cause unknown. Amount of damage, $30,000.

WAPAKONETA, OHIO.—St. Mary's Standard China Works burned, July 21, throwing 300 men out of work. Cause unknown. Amount of damage, $100,000.

HAZLETON, PA.—The Crystal Bridge Coal Breaker and adjacent buildings burned, July 23. Cause unknown. Amount of damage, $60,000.

HAMILTON, OHIO.—The Lane Free Library Building struck by lightning and partly burned. Amount of damage, $1,500.

NOTES—QUERIES—CORRESPONDENCE

Editor, MUNICIPAL JOURNAL AND ENGINEER,
Flatiron Building, New York City.

Dear Sir:—Having read the query of "A. E.," and your reply in your issue of June 27th, I am induced to send you a copy of my last annual report of the Water and Light Department of this little city, which, though small, 6,000, does some things as well as her much larger sisters. On page 5 of the report will be found the cost of operating the plant last year, including interest on the bonds issued for its construction, $12,792.14, while the gross earnings were $10,725.13, leaving the balance to the expense account of $2,067.01, against a service valued—low estimate—at $7,495.00. Our people are well pleased with this showing. When the character of the service is considered and the absolute control of the whole matter is also taken into account, a much less bright showing would still be good.

Our little city being one of the Southern pioneers in municipal ownership, with which all our citizens are satisfied, we desire to let the outside world know what we are doing and what we are.

L. H. W.

ANSWER to A. W. G.—Boards of Public Works may be appointed, but in most instances they are elected by the votes of the city at large instead of by wards. This system leads to the selection of well-known men, but is likely to introduce party politics into municipal government. In the largest cities, like New York, Philadelphia and Chicago, the ordinary functions of a Board of Works are exercised by Commissioners, and this is the system that meets with increasing favor. To explain the ordinary functions of a Board of Works, we will briefly describe the Newark, N. J., Board of Street and Water Commissioners, as it is called. This board is composed of five members, who are elected for a term of two years and who, as a matter of custom, are generally re-elected once or twice, so that the board has a permanent element in its make-up. In the city manual where their names appear the letter R or D is placed opposite their names, so that the political character of the board is recognized. In this connection it will interest those who favor party, as well as good government, that there has been no scandal in connection with the work of the Newark, N. J., board for many years. The board is divided into five committees, although every member of the board is a member of each committee. This arrangement is to provide a responsible chairman to look after the details of each department. The committees are Finance, Water, Streets, Sewers and Drainage, and Public Lighting. The chairmanships of the committees are assigned according to seniority. The chairman of the Finance Committee, being the senior, is also the President of the Board. The Chief Engineer is elected by the board and his tenure of office is indefinite; as an example of the security of tenure, it is interesting to note that the former engineer who resigned a few years ago was in the service of the city 40 years. The present engineer is paid $7,000 a year, and there are heads of departments under him whose salaries are several thousand dollars. There is also a Superintendent of the Board, who looks after the repair of streets and partly after the construction of new work. We doubt if there are any two cities in the country that have exactly the same form of administration, although many States, like Pennsylvania, divide the cities into classes, according to population, and legislate for them as a class. A study of the charter of each city in detail is, so far as we know, the only way of obtaining specific information on the points desired. Most charters are voluminous documents, in some cases covering hundreds of pages.

ANSWER to T. H.—The cost of electric lighting under municipal ownership in Reading, Mass., where the 2,000 C. P. lamps—they are not the standard—are used, is given as $53.34 per year, burned 1,528 hours, being $.0349 per hour and furnishing 343 C. P. for one cent. Detroit, Mich., is the only other city in which we find an account of this capacity lamp being operated by the municipality. There the cost is given as $80.81 per lamp per year, burned 3,791 hours, costing $.0231 per hour, furnishing 938 C. P. for one cent.

A Cliplet

Into the water-well
That the plumbers built her,
Our Aunt Eliza fell!—
Now we've bought a filter.
—*Exchange.*

Utilities, Trade Notes and News

MUD ROLLER.—Julian Scholl & Co., 126 Liberty street, New York City, in Circular No. 18, describe a universal puddling roller designed for reservoir and embankment work. These rollers have strong engines and their center of gravity is low. They will run a long time on one filling of the water tank and coal box. Special forms of grooving are applied to suit the nature of the work. Both steam and hand steering gears are provided. The diameter of the front wheel is unusually large. Besides being useful for purposes stated, they might do good work in muddy streets when a roller is needed to consolidate trenches and the bottom is too soft to permit the use of an ordinary roller.

POCKET TAPELINE.—The Tiffin Wagon Company, Tiffin, O., are sending out a souvenir 5-foot spring tapeline in a celluloid case. On one side is a portrait of Edward Tiffin, first Governor of Ohio, and on the other a colored picture of the general purpose wagon which the company manufactures.

PORTLAND CEMENT.—The Marquette Cement Manufacturing Company, La Salle, Ill., issue a circular booklet in barrel form as it were. The leaves contain a few illustrations of the use of their cement and some testimonials from users.

SEWER PIPE.—The American Sewer Pipe Company, Pittsburg, Pa., the largest manufacturers of sewer pipe in the world, publish a price-list of sewer pipe which gives a complete list of their products. They manufacture sewer pipe, culvert pipe, flue linings, paving brick, fire clay and all kindred wares. Besides fittings and special pieces for pipe drains, invert blocks for single or double ring brick sewers are described; these increase the flow of water in the sewer as compared with a brick bottom. Chimney tops in various shape to increase draft and for ornament are illustrated. Among the less known specialties are a vitrified coping for brick walls, vitrified building blocks, drip stones, gutter tile and curbing.

SPIRAL RIVETED PIPE.—The Abendroth & Root Manufacturing Company, Newburgh, N. Y., in Handbook 39, gives some valuable hydraulic data as well as a price-list of Root spiral riveted pipe, water tube boilers, hydraulic mining supplies and some specialties. The account of their plant and method of manufacturing spiral pipe is interesting. The plant occupies an area of twelve acres, of which four acres are occupied by buildings; the organization of the business comprises twelve distinct departments. Spiral pipe is made of sheets of steel 11⅞ inches wide and about 10 feet long, very accurately trimmed; the strips are welded end to end into a band 150 to 400 feet long and wound on reels. From the reels, mounted on carriages, the bands are fed into the pipe machines which form and rivet the pipe into lengths usually of about 20 or 25 feet. After hydraulic testing, the lengths are placed in a tank containing hot melted asphalt, where it takes on a tough, elastic coating of bitumen about 3-32-inch thick. Instead of this treatment, the pipe may be galvanized. Jointing of the lengths may be accomplished by the Root bolted joint, which is highly recommended, or by a flanged joint of familiar style. A recent testimonial from Gustav Haerle, President, Lexington Water Company, Lexington, Ky., states that he has recently examined Root pipes laid twenty years ago and found them in a splendid state of preservation. He states that they never have leaks from the bolted joint and that they now have in use nine or ten miles of 4 to 14-inch pipe.

A COMPENDIUM

Current Topics of Municipal Interest—Opinions on City Affairs

America's Gateway.—Accurately speaking, America, like its old colonial mansions, possesses two front doors. The one faces the morning sun, the other looks toward its going down. It may be that some day San Francisco's Golden Gate will challenge New York's supremacy as the terminal of international intercourse, but just now it is in the eastern metropolis that the great world-streams of travel and commerce converge, and as yet fair Manhattan remains the real front door of the nation. Innumerable advantages combined to give the proud little island at the mouth of the Hudson its exalted position. Not least among the number is New York Bay, a magnificent harbor that, like a spacious entrance lodge, offers a pleasant resting place to all who come from beyond the sea. Opening into the ocean through the Narrows, it lies inclosed within the protecting shores of New Jersey and Long Island. Big enough to anchor the fleets of the world, its blue waters have borne upon their bosom nearly every type of craft that floats.—Four-Track News.

Shattered Idols.—We look upon the fallen gods of yesterday as dim images of a receding past, and are inclined to forget the development of each generation that brought about the changes leading up to what we see fit to believe is a present perfection. As people lived, they learned. Progress brought about transitions. What the primitive man worshiped would not do for his advanced and more enlightened descendants, and the numerous gods of the intellectual ancients are the butt of many a jest in the joke books of this period. The history of advertising, also, is marked by periods of scientific development. The fallacies of yesterday are shattered idols to-day, though, peculiarly enough, some people are still worshiping them. It is such a costly matter, however, for business men to give substantial offerings to the fallen and discredited publicity gods that the progressive ones have pinned their faith to the more recent and productive advertising mediums.—Profitable Advertising.

The Trend in American Education.—It is coming to be accepted without cavil that the State may not only build up a State library for the use of State officials, legislators, and judges, but a State library for the aid of the professions, or for any other interest which may be aided by a collection of books which it cannot itself easily secure or maintain; that books may be loaned from the State library to anyone needing them; that local libraries are to be encouraged, subsidized, and guided; and that traveling libraries may be sent about the State to aid study in any direction. This tendency goes beyond libraries; it extends to museums and all collections which may interest and instruct the crowd; it is very jealous of original historic manuscripts and mementos; it sends standard pictures to the schools and all manner of institutions, and it gives help to art centers, reading circles, study clubs, lecture assemblies, and all other intellectual activities, whether they are individual or associated.—Appleton"s Magazine.

LEGAL DIGEST—

A Summary and Notes of

RECENT DECISIONS

City Can Compete

Knoxville Water Co. vs. Knoxville, Tenn.—The court decides that it is not an impairment of the obligations of contract for a municipality to give a water company an exclusive franchise for thirty years as against any other person or corporation, and then establish its own independent system of waterworks under subsequent legislative authority. It is held that a municipal grant of a waterworks franchise is not to be construed by implication to divest the municipality of its power to construct an independent waterworks system of its own. A collateral point raised and decided was that a bill to enjoin the municipal construction of a waterworks system, on the ground that the complainant had a contract with the municipality giving it exclusive privileges, the obligations of which, it is insisted, would be impaired by such action on the part of the municipality, raises a question giving the Federal courts jurisdiction, even though, as it happens in this case, the parties to the suit are all citizens of the same State.—U. S. Supreme Court.

Garbage Furnace a Nuisance

Collins vs. McKeesport, Pa.—Where the location of a garbage furnace within the city limits is a proper one under the circumstances, a decree for its removal will be refused, although its operation is shown to be an injury to health and property in the neighborhood. Where it appears to the court, however, upon hearing the evidence upon a bill in equity to restrain its operation and to enforce its removal, that it can be operated so as to cause no nuisance, a decree requiring it to be so operated will be made.—Court of Common Pleas, Allegheny County, Pennsylvania.

Injury from Escaping Gas

Donahue vs. Keystone Gas Co.—A company which negligently permits gas to escape from its pipes in the highway, so that it destroys shade trees in front of abutting property, is held to be liable for the injury thereby done to such property, although the fee of the street is in the public.—New York Supreme Court.

Rights of Firemen

Gatcomb et al., vs. Chief Litchfield.—The Supreme Court has allowed a writ of mandamus against Chief Litchfield, of Quincy, Mass., Fire Department. The contention of ex-City Solicitor Blackmur, who represented Gatcomb et al., was that the Mayor had no authority to remove the firemen; that under the city charter and Civil Service rules they could only be removed by the chief, for cause, and that then they would be entitled to a hearing. The men claim that they received no notification whatever; that they were dropped, but heard of the appointment of others. Chief Litchfield says that he never dropped the men, and has considered them as "call men."—Massachusetts Supreme Court.

WHO'S WHO IN MUNICIPAL WORK

LARKIN, John B.—Born in Pittsburg, Pa. Democratic candidate for Comptroller of the city in 1896. Was nominated by the Charter people (Citizens' party) for Comptroller and, after indorsement by Democratic party, was elected in 1902 by nearly 9,000 majority. Been in office over four years. Was Postmaster of the city for four years eleven months by appointment of Grover Cleveland, May, 1885. Residence, Pittsburg, Pa.

SMITH, Robert Armstrong, Mayor of St. Paul, Minnesota, 1906-1908, now serving eighth term, the first being to fill unexpired term of retiring incumbent. Born at Booneville, Ind., June 27, 1827; graduated from law department of Indiana State University in class of 1850; elected Auditor of Warwick County, Ind., same year; resigned and removed to St. Paul in 1853; engaged in the banking business from 1866 to 1896; has been a candidate for elective office over twenty times during an active public career covering more than forty years, and never suffered but one defeat at the polls. During his residence in Minnesota has also acted as Secretary to Territorial Governor, 5 years; County Treasurer, Ramsey County, 12 years; member and President of the Common Council of St. Paul, 4 years; State Senator and State Representative, 6 years; Postmaster of the city of St. Paul, 4 years; member and President of the Board of Managers of the Minnesota State Reformatory, 6 years, and member of the Board of Trustees of State Hospitals for the Insane, 7 or 8 years; served also as Democratic Presidential elector in the election of 1888, polling over 8,000 votes more than the highest of his associates on the ticket, and coming quite near to representing the State of Minnesota as a Democrat in the electoral college; has represented his party as delegate-at-large in three Democratic national conventions—1880, 1884 and 1888—and declined election to a fourth; announced his intention during last city election not again to be a candidate. Residence, St. Paul, Minn.

SPRATT, Wm. E.—Mayor of St. Joseph, Mo.; elected 1904, re-elected 1906. Fourth Democratic Mayor of city since 1878; born at Lexington, Mo., in 1867; educated at St. James' Military Academy, now Blees Military Academy, Macon, Mo.; has been a real estate and loan broker in St. Joseph for twenty years; married daughter of Hon. James Cowgill, former State Railroad and Warehouse Commissioner of Missouri, in 1890; has never before held any office, elective or appointive. Mr. Spratt is an advocate of municipal ownership, and believes that, in its absence, cities should have power to control rates and service of all public utilities, such as street cars, telephones, light, water. He believes that extensive public improvements, such as parks, boulevards, public buildings, sewers, and well-lighted, clean streets, are the only enduring success of any municipality, and is an advocate of concentration of power in the head officials of a city government, believing that municipal government should be divided into executive, legislative, and administrative departments, each of which should be held absolutely responsible for the conduct of its affairs, thus eliminating much strife and enmity which creep into many city administrations; also that all appointive power should be vested absolutely in the Mayor. Residence, St. Joseph, Mo.

ADVANCE AND WEEKLY CONTRACT NEWS

Relating to Municipal and Public Work—Street Improvements—Paving, Road Making, Cleaning and Sprinkling—Sewerage, Water Supply and Public Lighting—Fire Equipment and Supplies—Buildings, Bridges and Street Railways—Sanitation, Garbage and Waste Disposal—Police, Parks and Miscellaneous—Proposals and Awards

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All items arranged alphabetically by States.

STREET IMPROVEMENTS

Clearwater, Fla.—The citizens will vote, August 7, on issue of $3,000 street bonds.

Live Oak, Fla.—Bids will be opened, September 15, for $20,000 5 per cent. 30-year street bonds.—M. L. Burnett, Chairman.

Logansport, Ind.—The Committee on Streets has approved the petition of property owners of Pearl street for a Porter brick pavement.

Ashland, Ky.—Bids will be opened, August 13, for $15,000 6 per cent. street improvement bonds.—J. A. Meredith, City Clerk.

Annapolis, Md.—An election is to be held to vote on issue of $25,000 bonds for street improvements.

Grand Rapids, Mich.—Bids were received, July 30, for $200,000 coupon bonds for improving streets.—John L. Boer, City Clerk.

York, Neb.—Bonds, $20,000, have been voted for paving.

Addyston, O.—Bids will be received, August 1, for the purchase of $3,000 paving and $1,500 village 5 per cent. bonds.—William Coleman, City Clerk.

Cincinnati, O.—Bids are invited for $140,000 bonds for Liberty street viaduct repairs.

Columbus, O.—Residents of West Third street have petitioned Council to have the street paved with asphalt.

Fremont, O.—Bids for street paving have been rejected; they will be re-advertised.

Greenville, O.—Council will issue $23,000 bonds for street improvements, to include the construction of a concrete bridge over the creek at Broadway.

Norwalk, O.—Bids will be received, August 2, for $10,000, for $15,000 and for $5,500 4 per cent. street improvement bonds.—P. P. Kellogg, Auditor.

Piqua, O.—Bids are invited for $30,000 bonds to resurface the streets.

Xenia, O.—Council is considering issue of $49,500 bonds for improving Second street.

Louisa, Va.—An election will be held, August 9, to pass on issue of $6,000 5 per cent. 30-year street improvement bonds.

PROPOSED WORK

Aurora, Ill.—An ordinance has been passed for improving Iowa and North Lincoln avenues by paving and curbing.

Sedalia, Mo.—Portions of Grand avenue are to be paved.

Grand Island, Neb.—Council is arranging to pave certain streets.

Ashland, O.—Council has passed a resolution for constructing 10,000 feet of sidewalks, flag, stone or cement.

Canton, O.—Legislation is pending for improving Cleveland avenue by laying sidewalks, curbing, etc.; also on Blain avenue and Bluff street.—C. C. Lloyd, City Clerk.

Columbus, O.—An ordinance has passed Council for paving, curbing, etc., portions of Bolizar street.

Hamilton, O.—Council has decided to pave the roadway of South Second street with sheet asphalt, brick or bituminous macadam.

Mt. Vernon, O.—Legislation is being considered for paving Vine street with vitrified brick, sheet asphalt, or block asphalt, and setting new curb of stone or cement.—J. H. Wootton, City Clerk.

Springfield, O.—Council has decided to improve West High street by grading, curbing and guttering.

Troy, O.—Legislation is being considered for paving West Main street.—Charles Rannells, City Clerk.

Warren, O.—Legislation is pending for improving Niles avenue by grading, draining, curbing and macadamizing.—Charles D. Selby, City Clerk.

Wauseon, O.—Legislation is pending for paving the central twenty-eight feet of Fulton street, with fire brick on concrete foundation, building curbs, retaining walls, gutters and culverts.—Charles J. Hodges, City Clerk.

Wooster, O.—The resolution to pave College avenue has passed its third reading; the paving of Columbus avenue is being considered.—J. B. Minier, City Clerk.

Burgettstown, Pa.—The borough will spend $8,000 for paving the main street; bonds will be issued for the improvement.

CONTRACTS TO BE AWARDED

Washington, D. C.—Bids will be received, August 3, for paving various streets and avenues with sheet asphalt, according to plans and specifications.—Henry L. West, John Biddle, Commissioners, D. C.

Chicago, Ill.—Bids were received, July 26, for paving certain portions of North 56th street, according to plans and specifications.—William L. O'Connell, Commissioner of Public Works.

Chicago, Ill.—Bids were received, July 26, for constructing cement walks in certain streets, according to plans and specifications.—John A. May, Secretary, Board of Improvements.

Akron, O.—Barnett & O'Marr are low bidders for paving Adams street with brick.

Ashland, O.—Bids will be opened, August 6, for grading, paving and curbing Walnut street.

Ashtabula, O.—Bids will be received, August 14, for paving South Main street with about 8,000 square yards of asphalt block, and laying 6,000 lineal feet of cement curb and gutter.—Lewis A. Amsden, City Engineer.

Bucyrus, O.—Bids will be opened, August 15, for paving Prospect street with Trinidad pitch, lake sheet asphalt, bitulithic or bituminous macadam, together with grading, curbing, gutters, etc.—F. E. Donnenworth, Clerk, Board of Public Service.

Dayton, O.—Bids were received, July 27, for paving about 50,000 square yards of streets with brick or macadam; also laying curbing, etc.—William F. Miller, City Clerk.

Findlay, O.—Bids will be opened, August 2, for paving West Lincoln street with block.—J. C. Edie, City Clerk.

New Philadelphia, O.—Bids will be opened, August 17, for paving South Broadway a distance of 14,550 feet, and constructing cement sidewalk.

CONTRACTS AWARDED

Richmond, Ind.—J. F. Cronin has been awarded contract for constructing cement sidewalks on both sides of Fourteenth street; curbs and gutters will cost 69 cents a lineal foot.

Ashland, O.—David A. Phillips has contract for paving Third, Fourth and Vine streets; sand filler, gravel bed, and four-inch curb, are to be used on all streets, Malvern Big Four blocks on two streets, and Minerva blocks on the third.

Dayton, O.—The Barber Asphalt Company has the contract for paving Main street with asphalt, at $9,000.

Fremont, O.—George Kinney has been awarded contract for paving Franklin street, at $11,782.

Greenville, O.—F. M. Kemp & Sons, Middletown, have been awarded contract for paving five streets with Metropolitan block, aggregating over $50,000.

Martins Ferry, O.—The Suburban Brick Company has been awarded contract for furnishing all the block for paving, at 49 cents per square yard; J. S. Stringer and George Clifford will perform the work.

Plain City, O.—Evans & Harper, Zanesville, have the contract for macadamizing streets, costing $1,300.

Tiffin, O.—Frank Morcher has been awarded contract for paving Greenfield street with Hocking Valley paving block, at $6,149.

Youngstown, O.—James McHerron has been awarded contract for paving Oakhill avenue with Bessemer brick and stone curb; John Grady, paving North avenue, and Miller, Mullin & Caldwell, paving Watt street with Bessemer brick.

Meadville, Pa.—Thomas McGuigan has contract for improving part of Park avenue; the entire avenue will be paved with asphalt block.

Dallas, Tex.—The Texas Bitulithic Company has been awarded an additional contract for 15,000 square yards of bitulithic.

Wheeling, W. Va.—H. A. Strauss has contract for paving the National and River roads with brick.

Janesville, Wis.—C. E. Rullidge & Co. have been awarded contract for paving Roes street and Postoffice alley, 4,820 yards, with brick, at $7,693.67.—C. V. Kerch, City Engineer.

ROADS

Bloomfield, Ind.—Bids were received by the County Commissioners, July 27, for $47,000, 4½ per cent., 20-year road bonds.—Address, County Auditor.

Green Castle, Ind.—Bids will be received, August 4, for improving 25,629 feet of macadamized road.—C. C. Hurst, Auditor.

Jasper, Ind.—The Board of Commissions of Dubois county will receive bids, August 6, for constructing five miles of gravel road in Columbia township.—M. A. Sweeny, County Auditor.

Valparaiso, Ind.—Bids will shortly be opened for constructing 122 miles of gravel road.—Porter County Commissioners.

Rochester, N. Y.—Bids are invited for repairing all the improved roads in Monroe County, aggregating eighty-three miles; estimated cost, $45,000.—Henry A. Van Alstyne, State Engineer and Surveyor.

Columbus, O.—The Commissioners of Delaware and Franklin counties have agreed on the construction of a macadamized stone pike, east from Westerville, a distance of six miles, at an average cost of $6,000 per mile.

New Philadelphia, O.—The paving and reconstruction of the roadway between the B. & O. and river bridge has passed Council, under suspension of the rules.

Vernon, O.—Bids will be opened, August 21, for $20,000, 4 per cent., road improvement bonds.—Frank Freese, Town Clerk.

Amarillo, Tex.—The Attorney General has approved an issue of $20,000 road and bridge bonds.

SEWERAGE

Clearwater, Fla.—At an election, August 7, the citizens will vote on issue of $7,100 sewer bonds.

Grand Rapids, Mich.—Bids were received, July 30, for $104,000 coupon bonds, for constructing the West Side Ditch.—John L. Boer, City Clerk.

Hallock, Minn.—The proposition to issue bonds for a sewerage system carried.

Bowling Green, O.—Council is preparing to extend sewers in certain districts.

Lockland, O.—Bids will be received, August 13, for the purchase of $80,000, 4 per cent., 40-year sewer bonds.—Albert H. Rolef, City Clerk.

Norwalk, O.—Bids will be received, August 2, for $9,500, 4 per cent., sewer bonds.—P. P. Kellogg, Auditor.

Erie, Pa.—The construction of an intercepting sewer is recommended to improve sanitary conditions.—Mayor Saltsman.

South Boston, Va.—The citizens have voted to issue $100,000 bonds for sewerage, fire protection, and school purposes.

PROPOSED WORK

San Diego, Cal.—Arrangements are being made for a sewer system in the Golden Hill District.

Harrisburg, Ill.—The citizens have voted $18,000 bonds for sewers.

Muskegon, Mich.—Council is considering plans to establish a complete sewer system.

Bemidji, Minn.—Bids are invited for constructing a sewer system.

Hallock, Minn.—The proposition to issue $10,000 sewerage bonds carried.

Silver City, N. M.—Arrangements are being made to construct a sewer system.

Ashtabula, O.—Council is considering the construction of a sewer in Lake and Prospect streets.—Frank Wagner, City Clerk.

Bowling Green, O.—Council has passed resolution for building the new Court street sewer.

Canton, O.—Council is considering laying of sanitary sewer in Wheeler street and Linden avenue.—C. C. Lloyd, City Clerk.

Cincinnati, O.—Plans are being prepared for a sewer system in Elmwood place; the system will be divided into three or four districts.—Engineer Tozer, North Side.

Columbus Grove, O.—Council has decided to readvertise for bids for the sewer in Sycamore, Elm and North streets.

Delaware, O.—Fountain and Montrose avenues will probably be improved by sewering.—F. D. King, County Clerk.

East Liverpool, O.—Council is preparing to build a sewer on Caroline avenue.

East Liverpool, O.—The sanitary conditions at Chester will be improved by sewering the lower part of the town, south of Carolina avenue; 18-inch terra-cotta pipe will be built to the river.

Lorain, O.—Council has provided for the construction of a number of sewers and for extensive sewer improvements, including new sewers in Grove, Fox and Florence streets, and Gawn and Highland avenues; a sub-main sewer district is also to be established in South Broadway, and a sewer constructed in Penfield avenue.

New Philadelphia, O.—Council has decided to construct a number of sewers, for $6,112; surveyor estimates the cost of a brick trunk sewer at $30,000.

Piqua, O.—Council has recommended the extension of the sewer in Lincoln street.

Salem, O.—Council is considering laying sewer in Washington and Evans streets.—George Holmes, City Clerk.

Steubenville, O.—An ordinance is being considered for constructing sewers in Sixth street.

Zanesville, O.—Council is considering laying of sewers in Howard and North Seventh streets.—Neil Starkey, City Clerk.

North Wilmington, Pa.—Plans have been completed for a sewerage system.—George E. Zahuringer, Newcastle, Engineer.

Pittsburg, Pa.—Estimates are being made to construct Nine Mile Run sewer, expense to be borne by Pittsburg, Wilkinsburg, Linsville, and Edgewood.

South Boston, Va.—Council has appropriated $100,000 for improving the sewerage system, equipipng the Fire Department, and erecting schoolhouses.

CONTRACTS TO BE AWARDED

Chicago, Ill.—Bids will be received, September 12, for constructing a transformer sub-station, according to plans and specifications.—Robert R. McCormick, President, Board of Trustees, Sanitary District of Chicago.

Boston, Mass.—Bids will be received, August 3, for the construction of sewers in Section No. 64, Malden Extension, according to plans and specifications.—William N. Davenport, Secretary of Sewer Board.

Escanaba, Mich.—Council invites bids, August 7, for 4,678 feet, 8-inch pipe, for sewers. T. T. Burke, City Clerk; D. A. Brotherton, City Engineer.

Morrison, Minn.—Bids were received, July 30, for constructing a septic tank sewerage system.—Loweth & Wolff, St. Paul, Consulting Engineers; C. B. Burpress, City Clerk.

Torah, Minn.—Bids were received, July 25, for installing a sewer system, according to plans and specifications.—S. S. Shaute, St. Cloud, Consulting Engineer; Joseph Vogt, Village Recorder.

Tuckahoe, N. Y.—Bids were received, July 30, for constructing a sewage-disposal works and system of sewers.—William Rubly, President, Board of Trustees; Thomas J. McCarthy, Village Clerk.

Salem, O.—Bids will be opened, August 14, for constructing a sewer in the east side of Broadway from Columbia street, south.—George Holmes, City Clerk.

Terrell, Tex.—Bids were received, July 23, for constructing a sewage-disposal plant at the North Texas Hospital for Insane.—John S. Turner, Superintendent.

Janesville, Wis.—Bids will be received, August 10, for constructing sewers, according to plans and specifications, District No. 5; in Center avenue, from Pleasant street to manhole near North street, and in alleys lying between West Milwaukee street and Wall street, from High to Marion street, approximately 2,124 lineal feet; work to be started August 25, and completed by October 15.—J. F. Hutchinson, C. V. Kerch, John J. Sheridan, J. J. Dulin, W. H. Merritt, Special Assessment Committee.

Janesville, Wis.—Bids will be received by the Special Assessment Committee, August 10, for constructing sewer in District No. 6; in Ravine street from Madison street to Washington street, in Washington street from Ravine street to a point 110 feet south of Mineral Point avenue, in North River street from West Bluff to Madison street, approximately 3,529 lineal feet; work to be started October 15, and completed June 1, 1907.—C. V. Kerch, City Engineer.

Janesville, Wis.—Bids will be received by the Special Assessment Committee, August 10, for building sewers in Districts Nos. 10 and 11; in North Main street from Prospect avenue to North Fifth street; on Fourth avenue from North Main street to North Bluff street; on north Bluff street from Fourth avenue to Glen street, approximately 1,998 feet; work to be started September 1, and completed by November 1.—C. V. Kerch, City Engineer.

Janesville, Wis.—Bids will be received, August 10, by the Special Assessment Committee for building sewers in District No. 12; in South Main street from South First street to the southern boundary of the district, between South Third street and Oakland avenue; on North First street from North Bluff street to a point between Wisconsin and East street, approximately 1,744 feet; work to be started October 15, and completed by June 1, 1907.—C. V. Kerch, City Engineer.

Janesville, Wis.—Bids will be received by the Special Assessment Committee, August 10, for constructing sewers in District No. 14; in South Main street, from northern boundary near Oakland avenue to southern boundary at Racine street, in Racine street from South Main street to Rock river, approximately 1,143 feet; work to be started October 15, and completed by June 1, 1907.—C. V. Kerch, City Engineer.

Janesville, Wis.—Bids will be received by the Special Assessment Committee, August 10, for constructing sewers in District No. 15; in South Main street from northern boundary at Racine street to manhole near southern boundary between Clark and Carrington streets, approximately 1,238 feet; work to be started October 15 and completed by June 1, 1907.—C. V. Kerch, City Engineer.

Milwaukee, Wis.—Bids were received, July 28, for constructing sewers in 29th street, according to plans and specifications.—Peter J. Koehler, Deputy Comptroller.

WATER SUPPLY

Grand Junction, Col.—The citizens will vote, August 1, on issue of $300,000 bonds for a modern mountain water system.

Clearwater, Fla.—The issue of $15,000 waterworks bonds will be voted on August 7.

Oropino, Ida.—The question of issuing bonds for waterworks will be submitted to a vote of the citizens.

Clinton, Ill.—Council has voted $15,000 to improve the water system; several miles of pipe will be laid and new wells sunk.

Fairbury, Ill.—An ordinance has been passed authorizing issue of $8,000 bonds for improving the pumping plant.—J. W. Bennett, Clerk.

Otterbein, Ind.—Bids are being received for $6,500 waterworks bonds.

Fairview, Mich.—The citizens have voted $25,000 bonds for extending the water system.

Wilmot, Minn.—Bids were received, July 25, for $7,000, 5 per cent., waterworks bonds.—O. H. Tillman, President.

Natchez, Miss.—Council is considering issue of $100,000 bonds for a municipal water and light plant.

Osyka, Miss.—The citizens will vote on issue of $25,000 waterworks and electric-light bonds.

Kansas City, Mo.—The issue of $1,000,000 bonds for improving the water system has been recommended.—E. I. Farnesworth, Commissioner of Public Works.

Salem, N. C.—The city has voted to issue $125,000, 5 per cent., 30-year waterworks bonds.

Cuyahoga Falls, O.—Bids will be opened, September 3, for the purchase of $4,500 4 per cent. bonds for constructing a waterworks reservoir and purchasing two air-lift water pumps.—C. D. Crum, Village Clerk.

Dayton, O.—The Board of Public Service has rejected bids for a high pressure water system, all being in excess of estimates; new bids will be invited.—Maintenance Engineer McDargh.

Wauseon, O.—The citizens have voted $20,000 bonds to extend mains and improve the waterworks system.

Sweetwater, Tenn.—An election will be held to pass on issue of $50,000 water and light bonds.

White Salmon, Wash.—The White Salmon Water and Light Company has been incorporated with a capital stock of $70,000.—Address Carlton Lewis.

Marshfield, Wis.—The citizens have voted $35,000 bonds for improving the water and light plant.

PROPOSED WORK

Peoria, Ill.—Council has directed the Peoria Water Company to extend water mains on several streets.

Peoria Heights, Ill.—A water supply system is to be established.—Village Board.

Claremore, I. T.—Bonds, $85,000, have been voted for a water supply; the contract for the work will be let as soon as bonds can be issued and sold.

Louisville, Ky.—Another pumping station, to cost $250,000, is to be built.—Waterworks Board.

Fairview, Mich.—Council has appropriated $25,000 bonds for extension of the water plant.

Grand Rapids, Mich.—Two new pumps of 1,000,000 gallons' capacity are to be purchased to facilitate the extension of the water system.—D. A. Crow, Hydraulic Water Company.

Laurium, Mich.—The water system is to be improved.—Address Village Board.

Paw Paw, Mich.—The citizens have voted issue of $50,000 bonds for improving the water and light plants.

Cold Springs, Minn.—Bonds, $6,500, have been authorized for the construction of a water system.

Rochester, N. Y.—The Rochester and Lake Ontario Water Company proposes to extend system to Manitou.—Harry Bowers, President.

Fargo, N. D.—An artesian well will be sunk at the Agricultural College.

Hamilton, O.—A resolution has been passed by Council to expend $115,000 in repairs to the municipal waterworks plant.—Homer Guard, Clerk of Council.

Marion O.—A new filtering plant is to be constructed by the Erie Railway.

Springfield, O.—Petitions are before Council for extending water mains on about 20 different streets.

Montesano, Wash.—The Montesana Light and Water Company will install a new water system, the present supply being impure.—C. H. Kiehl, Superintendent.

White Salmon, Wash.—The White Salmon Water, Light and Power Company has been incorporated; a complete water system is to be constructed.—W. H. Moore, Portland, Ore., and Carlton Lewis, incorporators.

Hayward, Wis.—Bids will be received for sinking artesian wells.

CONTRACTS TO BE AWARDED

Chicago, Ill.—Bids will be received, August 10, for furnishing gate valves.—William L. O'Connell, Director of Public Works.

Chicago Heights, Ill.—Bids will be received, August 6, for constructing a pump pit at the waterworks station, according to plans and specifications.—John Gravelot, City Clerk.

Rochelle, Ill.—Bids were opened, July 26, for improving the water system, including one 250,000 gallon reservoir, two 150-h.p. boilers, one air compressor, one smokestack, foundations, etc.—Thomas E. Keegan, City Clerk.

St. Charles, Ill.—Bids were received, July 25, for $8,000 waterworks bonds.—T. Carlson, Clerk, Finance Committee.

New Orleans, La.—Bids will be received, September 5, for furnishing and erecting two complete water purification plants, one of 40,000,000 gallons capacity and one of 4,000,000 gallons capacity.—Hering & Fuller, New York, Engineers; F. S. Shields, Secretary, Sewage and Water Board; George G. Earl, General Superintendent.

Aurora, Minn.—Bids will be received, August 7, for the purchase of about 5,000 feet of six to four-inch water pipe.—F. V. Anderson, Village Recorder.

Torah, Minn.—Bids were received, July 25, for installing a waterworks system.—S. S. Shaute, St. Cloud, Consulting Engineer; Joseph Vogt, Village Recorder.

Orange, N. J.—Bids will be received, August 6, for furnishing pumping engines and appurtenances, to wit: One or more 3,000,000-gallon water engines and 1,250,000-gallon sewage pumping engine.—Edward S. Perry, Chairman Water Committee.

New York, N. Y.—Bids will be received, August 7, for constructing a reservoir, including the building of a large masonry dam across the west branch of the Croton river, an earth diverting dam across the east branch of the Croton river, and an open connecting channel; specifications and estimates are on file.—John F. Cowan, President; Harry W. Walker, Secretary, Aqueduct Commissioners.

Dayton, O.—Charles W. Snyder is the lowest bidder for constructing a water system in the southeastern section, at $90,000; bids for the pumping station will be opened shortly.

Britton, S. D.—The Marshall County Commissioners will receive bids, August 6, for drilling artesian wells.—B. S. Woodward, County Auditor.

Boyd, Wis.—Bids were opened, July 31, for constructing a complete steel tower and tank of 40,000 gallons' capacity, according to plans and specifications.—Ed. E. Martin, Village Clerk.

Milwaukee, Wis.—Bids will be received, August 1, for furnishing and erecting a 20,000,000-gallon pumping engine at the North Point pumping station, on the shore of Lake Michigan, according to plans and specifications.—Charles J. Poetsch, Stanley E. Czerwinski, V. J. Schoenecker, Jr., J. P. Sherer, Commissioners of Public Works; Peter J. Koehler, Deputy Comptroller.

Caldwell, O.—James B. Clow & Son, Chicago, have been awarded contract for materials for extending the waterworks system, at $2,296, and J. W. Cater the contract for labor.

PUBLIC LIGHTING

Lumpkin, Ga.—The city has voted issue of $15,000 electric-light and school bonds.

Clay Center, Kan.—The citizens have voted $20,000 bonds for a municipal lighting plant.

Brainerd, Minn.—The Brainerd Electric Power Company has been incorporated with a capital stock of $200,000.—Judd Wright, William D. McKay, Horace M. Woolman, incorporators.

Kelliher, Minn.—Council will probably install a municipal electric-light plant, by bonding the city; Messrs. Stoner and Jewett have been consulted as to plans.

Butte, Mont.—A franchise to establish a lighting plant has been asked for by T. A. Heinze.

Rockaway, N. J.—An election will be held to vote on issue of $30,000 electric-light bonds.

Bena, O.—Bids will be opened, August 20, for $3,500 bonds for improving the electric-lighting plant.—O. R. Stone, City Clerk.

Bryan, O.—Bids will be received, August 4, for $10,000 3 per cent. electric-light bonds.—R. W. Radabaugh, Village Clerk.

Chardon, O.—An ordinance has been passed for the issue of $3,500 village electric-light bonds.

Hamilton, O.—Bids are invited for $385,000 bonds for improving lighting and waterworks plants.

Hamilton, O.—Citizens will vote, September 1, on issue of $310,000 bonds for municipal gas, electric light, and water plants.

Terrell, Tex.—An election is to be held in August to decide question of establishing a municipal lighting plant.

Huntsville, Utah.—A franchise to furnish electric power and lighting has been petitioned for by the Utah Light and Railway Company of Ogden.

PROPOSED WORK

Traer, Ia.—Arrangements are being made to enlarge the electric-light plant.—F. L. White, manager.

Detroit, Mich.—The Midland Board of Supervisors has granted a franchise for the construction of a power dam on the Tittabawassee river, in Edenville, costing $800,000 or $1,000,000, to generate electricity; a dam will also be built in Jerome.—Frank I. Nixson and associates.

Flint, Mich.—Council has granted a franchise to erect a power dam to furnish light and power in the city to H. R. Loranger, of the Genessee Mills, Flint, and Robert O. Hart, of Flushing.

Poplarville, Miss.—The electric plant, recently destroyed by fire, will be rebuilt.—W. L. Thames.

La Belle, Mo.—The municipal lighting plant, recently destroyed by fire, will be rebuilt.

Hamilton, O.—Council has passed resolutions to expend $65,000 on repairs to the municipal electric-lighting plant, and $70,000 on the municipal gas works.—Homer Guard, Clerk of Council.

Mill Hall, Pa.—An electric-light plant is to be established by B. F. Long.

Center, Tex.—The Center Electric Light and Power Company has been incorporated with a capital of $15,000.—S. T. Fleshman, J. D. Reddett and R. Hardricier, incorporators.

CONTRACTS TO BE AWARDED

Jackson, Ga.—Bids were opened, July 26, for machinery and material for heater and light plant, in accordance with specifications.—J. B. McCrary, Atlanta, Engineer.

Idaho Falls, Ida.—Bids were received, July 30, for constructing the electric power plant on the Snake river.—D G. Platt, City Clerk.

Bloomington, Ill.—Bids will be received by the Board of Local Improvements, August 3, for furnishing and erecting engines and generators of sufficient size and capacity to furnish current for 500 arc lamps, together with switch boards, exciters, transformers, etc.; everything necessary for a complete and up-to-date lighting plant ready to run; also one direct connected automatic engine and generator, together with switch board and all necessary instruments for a complete and up-to-date plant, ready to operate and of sufficient size to run 1,400 16 C. P. incandescent lamps. Bids to include the taking out of seven old T. H. M. D. arc machines, 320 old T. H. M. D. lamps and the line shafting now in use.—J. S. Neville, chairman.

Gibbon, Minn.—Bids were opened, July 28, for constructing an acetylene gas plant, according to plans and specifications.—J. F. Johnson, Engineer; W. F. Lammers, Village Recorder.

Brookhaven, Miss.—Bids were received July 30, for new machinery for the power plant.

FIRE EQUIPMENT AND SUPPLIES

Hartford, Conn.—The Fire Chief has recommended the purchase of 10,000 feet of hose.

Gem, Ida.—Council is arranging to purchase fire apparatus.

Owensboro, Ky.—The Fire Chief recommends the erection of an additional engine house at Walnut street and McFarland street, to be equipped with chemical engine and hose wagon.

Northfield, Minn.—Council is considering purchase of fire hose.

Oslo, Minn.—A Fire Department is to be organized, and apparatus purchased.

Ashley, O.—Bids are invited for $1,800 bonds to purchase a new fire engine and fire apparatus.

Tiffin, O.—Bonds, $4,500, will be expended to purchase fire apparatus.

CONTRACTS TO BE AWARDED

Washington, D. C.—Bids will be received, August 6, for a site for a combination truck and engine house within the territory lying east of Rock Creek, west of 18th street and north of Florida avenue.—W. T. Belt, Chief Engineer; Henry Z. West, John Biddle, Commissioners.

Chicago, Ill.—Bids were received, July 31, for building an engine house at West 24th and South Whiffl streets.

Detroit, Mich.—Bids were received, July 30, for erecting a brick engine house at River road and Sulony avenue.—George W. Stockwell, Secretary.

Detroit, Mich.—Bids were received, July 23, for furnishing 25 single nozzle hydrants.—George W. Stoeckel, Secretary, Fire Commissioners.

MUNICIPAL BUILDINGS

Washington, D. C.—Bids were opened, July 24, by D. E. Garges, Secretary to Engineer Biddle, for extensive repairs and changes in the plumbing system at the M Street High School, as follows: Dunigan Plumbing Company, $9,750, and William Rothmill & Son, $9,921.

Washington, D. C.—Bids were received, July 30, for plumbing work in the Phelps and Tyler schools, according to specifications.—Henry F. West, John Biddle, Commissioners, D. C.

Logansville, Ga.—The city has voted issue of $10,000 5 per cent. 20-30-year school building bonds.

Belleville, Ill.—A special election will be held to decide question of issuing $35,000 school bonds.

Kendallville, Ind.—The city will shortly take up matter of building a new City Hall.

Okmulgee, I. T.—An election will be held to decide question of issuing $47,000 school bonds.

Phillips, I. T.—Bonds, $5,000, have been voted for a new school house.

Abilene, Kan.—The citizens have voted $35,000 bonds for erecting a high school.

Adrian, Mich.—Bonds, $50,000, have been voted for a new high school building, $8,000 for a new ward school and $5,000 for additional ground for a school lot.

Meridian, Miss.—Bids will be received, August 1, for $35,000 4½ per cent. 30-year school bonds.—I. R. McIlroy, Clerk.

Blue Springs, Mo.—The issuance of $6,000 school bonds has been authorized.

Kansas City, Mo.—Bids will be received, August 10, for $25,000 4 per cent. School District No. 5 bonds.—W. M. McElroy, Secretary of the Board.

Cincinnati, O.—Bids are invited for $300,000 bonds for a new branch hospital; plans have been prepared.

Nashville, Tenn.—Davidson County citizens will vote, August 2, on issue of $160,000 courthouse and jail bonds.

Spokane, Wash.—Bids will be received, August 4, for $2,500 6 per cent. 10-year school bonds.—C. K. Erwin, County Treasurer.

BRIDGES

Barberton, O.—It is proposed to widen the Wooster road bridge over Wolf creek.—City Clerk Davis.

Glendale, O.—An iron bridge will be built over the C. H. and D. Railroad, to replace the one destroyed by fire.

Salem, Ore.—Plans and specifications for a $6,000 reinforced concrete bridge across North Mill creek, have been approved by the Council; bids will shortly be invited.

Memphis, Tenn.—The City Engineer recommends that the Madison street bridge be built at the earliest opportunity.

Sinton, Tex.—The issue of St. Patricio county bridge bonds is being considered.—F. A. Hunter, County Judge.

Tacoma, Wash.—A petition, presented by Puyallup citizens, for the construction of a bridge across the Puyallup river, is being considered.—Pierce County Commissioners.

PROPOSED WORK

Indianapolis, Ind.—Bids will be re received, August 2, for a bridge over Indian Creek, on McConnell road, Lawrence township, and one over Crooked Creek, Washington township, according to plans and specifications.—Cyrus J. Clark, Auditor of Marion County.

Tipton, Ind.—Bids will be opened, August 6, for constructing two bridges in Jefferson township.—Tipton County Commissioners.

Topeka, Kan.—Bids will be opened, August 13, by the Board of Commissioners of Shawnee county, for two steel bridges, one to be located between Silver Lake and Valencia, and one between Rossville and Willard; to cost less than $20,000 each.—M. Snatlinger, County Clerk.

Meridian, Miss.—The County Clerk has advertised for bids, August 6, for three bridges, one to cross the branch of the Meridian and Philadelphia road, near Mrs. Reeve's place; another across Eshu's creek, near J. L. Eshu's place, and a third to cross the creek leading to C. L. Gunn's place; plans and specifications on file with the Chancery Clerk.—Lauderdale County Board.

Minneapolis, Minn.—Bids will be opened, August 6, for building bridge No. 44, according to plans and specifications.—Hugh R. Scott, County Auditor.

Cleveland, O.—Bids will be opened, August 4, for constructing a concrete culvert, per report No. 1289, in accordance with form of contract and specifications.—William H. Evers, County Engineer; Julius C. Dorn, City Clerk.

Conconully, Wash.—Bids will be opened, August 6, for constructing two truss combination bridges on Roads 10 and 12, to cost, approximately, $7,000.—Okanogun County Commissioners.

CONTRACTS TO BE AWARDED

Sacramento, Cal.—Bids were received, July 26, for constructing a steel bridge, 70 foot span, on the Freeman Colton road, at the Consumers river crossing, in accordance with plans and specifications.—W. R. Hamilton, Clerk, Board of Supervisors.

Denver, Col.—Bids were received, July 26, for constructing a wagon bridge, one span, 128 feet long, at Pagosa Springs, Aruchuleta county, according to plans and specifications. T. W. Jaycox, State Engineer.

Fort Wayne, Ind.—Bids were received at the Auditor's office, Allen county, July 14, for six concrete arches, as per plans and specifications.—J. L. Smith, Auditor.

Richmond, Ind.—Bids were received, July 16, for the construction of approaches or fills to Trothers Ford bridge in Green township.—C. E. Wily, T. R. Clark, John F. Dynes, Commissioners, Wayne County.

Newark, N. J.—Bids were opened, July 9, by the Board of Chosen Freeholders of Essex County for the following work: A steel and stone or concrete bridge on Ryerson avenue, Caldwell; steel and concrete covering for bridge on Runnymede avenue, Caldwell; steel and concrete covering for bridge on Hamilton avenue, East Orange; concrete arch bridge over the Elizabeth river on Lyons avenue extension, Irvington; a concrete culvert on Fortieth street, Irvington; nine hundred feet of 24-inch stoneware pipe on Washington avenue, Belleville, from Holland terrace to Second River bridge.—James Owen, County Engineer.

Milwaukee, Wis.—Bids were opened, July 28, for constructing a new protection pier for State street bridge, according to plans and specifications.

CONTRACTS AWARDED

Washington, D. C.—Stewart and Bratton have been awarded contracts for building four steel and concrete bridges.—John Biddle, Engineer Commissioner.

Lewiston, Ida.—McCreary and Willard, of Spokane, Wash., have been awarded contract to build 790-foot steel bridge across Clearwater river for the Oregon, Washington and Idaho Railway, at $96,000; the substructure will cost about $40,000 additional.

Bloomington, Ill.—H. S. Shade has been awarded contract for building a bridge, with concrete abutments, over Crooked creek.

Savanna, Ill.—The Continental Bridge Company, of Chicago, has been awarded contract to build five bridges in Woodland, at $4,115.

Newcastle, Ind. — The Pan-American Bridge Company has been awarded a contract to build a bridge on the County Line road.—Commissioners of Henry County.

STREET RAILWAYS

Tampa, Fla.—The Tampa Electric Company has been granted permission to extend its road from the town limits, at Michigan avenue, along Nebraska avenue, in the direction of Sulphur Springs.—Hillsborough County Commissioners.

Kewanee, Ill.—The stockholders of the Galesburg and Kewanee Interurban Railway have voted $400,000 bonds to complete the line to Galva.

Columbus, Ind.—A 50-year franchise to build an interurban railway from Columbus to West Baden has been granted Clinton S. Ferguson.—Bartholomew County Commissioners.

Logansport, Ind.—The Logansport and Lafayette Traction Company has filed a mortgage to secure the issue of $1,000,000 bonds to construct an interurban line.

PROPOSED WORK

Fort Smith, Ark.—The Council has granted Wharton Carnall and S. A. Williams a franchise for an electric street railway line; ultimately it will connect the city with all the coal mining towns in the western part of the State.

Athens, Ga.—The Athens Electric Railway Company will increase its capital from $125,000 to $275,000, and make a number of extensive improvements.

Tulsa, I. T.—The Tulsa Street Railway Company has been incorporated and will begin construction in 90 days; capital, $200,000.—J. M. Hall, President; P. L. Price, Vice-President; Fred S. Clinton, Secretary.

Alton, Mo.—The Alton, Jacksonville and Peoria Railway Company has increased its capital stock to $300,000 for the purpose of constructing an electric line between Alton and Jerseyville.

Findlay, O.—The Council has granted a 25-year franchise to the Findlay-Marion electric line.

Spokane, Wash.—The Inland Empire Railway Company will begin developing 10,000 horsepower, with facilities later for 20,000 horsepower, at an $800,000 plant to be erected at Nine Mile bridge, on the Spokane river.—Sanderson & Porter, New York, Designing and Constructing Engineers.

Chippewa Falls, Wis.—The Chippewa Valley Electric Company will extend its line to Menominee, Dunn County, and eventually to all towns in the section, making Eau Claire the central point.—O. H. Ingram, President.

Fort Washington, Wis.—The Milwaukee-Northern Railway has purchased dock property of C. O. Mueller, where it will build its power house and offices; work will begin September 1.

CONTRACTS AWARDED

Atlanta, Ga.—The N. P. Pratt Engineering Company has been awarded contract to build line for the Atlanta, Griffin and Macon Interurban Railway Company, of which Clifford L. Anderson is President.

Baltimore, Md.—Michael Elmore has the sub-contract from the Chesapeake Traction Company for double-tracking and realignment of two miles on the Western Maryland Railroad, including a 40-foot cut, which will necessitate moving of 200,000 cubic yards of earth; the Johnston-Perin Contracting Company has the contract from Mt. Hope to Mt. Wilson, and Walter H. Thorne from Mt. Wilson to Green Spring Junction.

Corby, Pa.—A contract has been awarded Charles Van Bibber, Boston, Mass., for completing the trolley line to Erie; cost, $1,000,000.

POLICE

Brooklyn, N. Y.—Bids will be opened, August 1, for making alterations and improvements to the Seventy-second Precinct Station House.—Theodore A. Bingham, Police Commissioner.

Canton, O.—An expenditure of $20,000 will be made for equipping police and fire alarm systems.—J. P. Fawcett, President, Board of Public Safety.

Columbus, O.—It is proposed to build several patrol sub-stations.—Board of Public Safety.

Richmond, Va.—Plans for the First District police station have been prepared by A. F. Hunt; cost of building, $15,000.

GARBAGE AND WASTE DISPOSAL

Union, N. J.—Bids were opened, July 30, for the removal of garbage for one year.—Address Town Council, Union, Hudson County.

Cincinnati, O.—Recommendation has been made that Council issue $145,000 bonds to provide dumping stations.—Board of Public Service.

PARKS

Washington, D. C.—Preliminary plans have been made for erecting a statue of Commodore John Barry on a public reservation, and appropriating $50,000 for that purpose.

Boston, Mass.—The Committee on Ways and Means reported a bill to provide for the enlargement of Mount Town reservation.

Rockport, Mass.—A park and playground are being laid out.

Duluth, Minn.—Efforts are being made to secure a tract of land on the lake shore for a public park.

Minneapolis, Minn.—A number of parks, including St. Anthony parkway, Riverside parkway, Riverside park and Minnehaha park, have been consolidated, and will be named Mississippi River park. The tract comprises about 700 acres, situated on both banks of the Mississippi.—Park Commissioner Decker.

New York, N. Y.—The Park Board is considering reclaiming the submerged river front and adding 101 acres to Riverside Park, between 72d and 96th streets.

Bayonne, N. J.—A public park, comprising 60 acres, located between the Boulevard, Newark Bay and Sixteenth and Nineteenth streets, will be opened.

Cleveland, O.—Council has authorized the Board of Public Service to purchase 2,019 acres of land from the estate of Constantia Sikorski, for $2,500, for park purposes.—C. W. Lapp, President of the Council; Peter Witt, City Clerk.

Salem, O.—The citizens have donated a 25-acre tract of land to be used as a public park.

Tulsa, Okla.—Plans are under way to secure a park.

Pittsburg, Pa.—A tract of land on South Twenty-second street will be appropriated for a public playground.—George W. Guthrie, Mayor.

Seattle, Wash.—The issuance of $1,100,000 park and lighting bonds is being considered.—City Comptroller Carroll.

Menominee, Wis.—Plans for improving all public grounds will be made by Warren H. Manning, Boston, Mass.

PROPOSED WORK

Palo Alto, Cal.—A park and boulevard will be constructed along Alma street.—Marshall Black, President, Improvement Club.

Washington, D. C.—A bill has been passed creating Mesa Verde a National Park in Colorado and New Mexico.

Chicago, Ill.—A playground will be built on the site formerly occupied by the old post office on the lake front.

Hampden, Me.—A tract of 22 acres of land owned by the Dorothy Dix Monument Association will be improved and used as a park.

Lawrence, Mass.—A tract of eleven acres of land has been presented for a public park.

Lawrence, Mass.—Improvements are to be made in Storrow Park, to cost about $1,000.—Daniel F. Daley, Commissioner.

Orange, Mass.—A seven-acre tract of land costing $4,000 will be used for a public park.

New York, N. Y.—A bill has been passed authorizing $2,500,000 to be spent for a seaside park.

Niagara Falls, N. Y.—A Commissioner has been appointed to make plans for a public park system.

Canton, O.—About $4,000 will be spent for parks and boulevards.—J. P. Fawcett, President, Board of Public Safety.

Cleveland, O.—An expenditure of $170,000 will be made for small public parks.

Delaware, O.—The grounds around the courthouse and jail will be parked.

MISCELLANEOUS

Ashland, O.—Bids will be opened, August 6, for bonds aggregating $14,800, bearing interest at 5 per cent.—A. P. Black, City Clerk.

Athens, O.—Bids will be opened, August 11, for bonds aggregating $3,100.—W. B. Golden, Clerk.

Bucyrus, O.—Council is considering issue of $15,000 special assessment bonds.

Cleveland, O.—An election will be held, August 14, to vote on issue of $1,750,000 bonds.—Tom L. Johnson, Mayor.

Elyria, O.—Bids will be received, August 7, for 4 per cent. bonds, aggregating $50,000.—Frank A. Fauver, City Auditor.

Lancaster, O.—Council is considering plans for extending the Hocking river improvement.—Address B. E. Shell.

Lorain, O.—The issue of $4,000 river improvement bonds has been authorized.

Mount Washington, O.—Bids will be received, July 28, for $2,500, 5 per cent., 10-year village bonds.—E. H. Stevens, Clerk.

CONTRACTS TO BE AWARDED

San Francisco, Cal.—Bids will be received, August 21, for pneumatic tubes or other similar devices for the post office.—Geo. B. Cortelyou, Postmaster General, Washington, D. C.

Washington, D. C.—Bids were opened, July 14, for plumbing work in the Corcoran and Lenox schools.—Henry L. West, John Biddle, Commissioners, District of Columbia.

Washington, D. C.—Bids were opened, July 16, for furnishing and delivering at the office of the Supervising Architect, Treasury Department, the drafting materials, in accordance with specification and schedule.—James Knox Taylor, Supervising Architect.

Chicago, Ill.—Bids were received, July 11, for 200 gross of mica chimneys for street lamps.—William Carroll, City Electrician, Room 12, City Hall.

Baltimore, Md.—Bids will be received, August 21, for pneumatic tubes or other similar devices for the postoffice.—Geo. B. Cortelyou, Postmaster General, Washington, D. C.

Boston, Mass.—Bids will be received, August 21, for pneumatic tubes or other similar devices for the post office.—Geo. B. Cortelyou, Postmaster General, Washington, D. C.

Detroit, Mich.—Bids were received, July 3, for one thousand, more or less, iron or wood street signs, that may be required by the city until July 1, 1907.—J. J. Haarer, Commissioner of Public Works.

Kansas City, Mo.—Bids will be received, August 21, for pneumatic tubes or other similar devices for the post office.—Geo. B. Cortelyou, Postmaster General, Washington, D. C.

Brooklyn, N. Y.—Bids will be received, August 21, for pneumatic tubes or other similar devices for the post office.—Geo. B. Cortelyou, Postmaster General, Washington, D. C.

New York, N. Y.—Bids will be received, August 21, for pneumatic tubes or other similar devices for the post office.—Geo. B. Cortelyou, Postmaster General, Washington, D. C.

Cincinnati, O.—Bids will be received, August 21, for pneumatic tubes or other similar devices for the post office.—Geo. B. Cortelyou, Postmaster General, Washington, D. C.

Columbus, O.—Bids were received, July 12, for delivery of Portland cement, as follows: 12,000 barrels at Akron; 1,700 barrels at Coshocton; 3,000 barrels at Middletown; 2,500 barrels at Defiance; 1,600 barrels at St. Marys, and 1,000 barrels at Spencerville.—Chas. F. Perkins, Chief Engineer of Public Works.

Columbus, O.—Bids were received, July 19, for constructing a concrete dam on Walhonding river; also for dredging Walhonding feeder from Rosco to Six Mile dam.—Charles E. Perkins, Chief Engineer of Public Works.

Plain City, O.—Bids for $1,000 bonds were opened, July 16, for repairing furnaces in school buildings.—E. H. Millot, Clerk.

Philadelphia, Pa.—Bids will be received, August 21, for pneumatic tubes or other similar devices for the post office.—Geo. B. Cortelyou, Postmaster General, Washington, D. C.

Pittsburg, Pa.—Bids will be received, August 21, for pneumatic tubes or other similar devices for the post office.—Geo. B. Cortelyou, Postmaster General, Washington, D. C.

Charleston, S. C.—Bids will be received, July 21, for machinery and generating sets for central power station at the Navy Yard.—Mordecai T. Endicott, Bureau Yards and Docks, Washington, D. C.

Oconomowoc, Wis.—The City Clerk received bids, July 23, for the steam heating system to be placed in City Hall.

WANTS

ARCHITECTURAL draughtsman; must be specially good on perspectives and rendering. Address, A. B. J., Municipal Journal.

ACTIVE, energetic, responsible man as inspector in contractor's concern; best references and $500 cash security essential. Outside, 84, Municipal Journal.

ARTISTS and draughtsmen, capable of laying out and executing general free hand illustrating; moderate rates; permanent. Designer, 86 Municipal Journal.

A COMPETENT free-hand draughtsman; should be qualified for high-class work. Address, 87, Municipal Journal.

DRAUGHTSMEN.—Architectural, mechanical, structural, electrical, are needed for responsible positions; salaries, $900-$2,500. Write us to-day, stating experience and position desired. Offices in 12 cities. Hapgoods, 305 Broadway, N. Y.

For Machines to Drill, Blast and Test Holes and Water Wells, write "LOOMIS CO., TIFFIN, O."

INCORPORATIONS

When our readers desire to correspond with any of the following companies, they should address the company itself or a director, incorporator or other official or partner by name to the address (if given) under such name. This will prevent letters being returned and marked "unknown."

Adamant Brick and Tile Company, 202 Hamilton avenue, Trenton, N. J. To manufacture brick, tile, etc. Capital, $125,000. Incorporators: Harry Crisp, George R. Whittaker, John T. Whittaker, Walter B. English, Laura English, Trenton, N. J.

C. T. Anderson & Co. (Incorporated), New York City, Engineers and Contractors. Capital, $100,000. Incorporators: Nelson G. Rogers, 156 Broadway; Henry Sheldon, 87 Nassau street; Ernest H. Oldendorf, 146 Spring street, all of New York.

A. W. Baily Company, 1809 Pacific avenue, Atlantic City, N. J. To establish and maintain dispensaries, hotels and training school for nurses, etc. Capital, $60,000. Incorporators: A. W. Baily, F. W. S. Patschke, W. T. Wheeler, all as above.

Buxton & Hollis Power Company, West Buxton, Maine. Light, heat and power. Capital, $1,000. President, F. H. Hargraves: treasurer and clerk, A. W. Flint, West Buxton, Me.

Chester Electric Company, Wilmington, Del. To deal in electrical supplies of all kinds and to supply electricity for light, heat, etc. Capital, $300,000.

Climax Contract Company, 15 Exchange place, Jersey City, N. J. Builders, building contractors and decorators. Capital, $100,000. Incorporators: H. O. Coughlan, B. Stafford Mantz, Felix Ingold, all as above.

John A. Lohram Quarry and Construction Company, St. Louis, Mo. Capital, $5,000. Incorporators: Nellie A. Lohram, Rudolph Bucholz and John Hall.

Jersey City Light and Equipment Company, 76 Montgomery street, Jersey City, N. J. Lighting establishments, etc. Capital, $100,000. Incorporators: Harry E. Crandall, 310 Broadway; James J. Farmer, 234 West 21st street, both of New York; Alexander Michel, as above.

Keystone Construction and Realty Company, Philadelphia, Pa. To construct and maintain public works, etc. Capital $150,000.

Mills Building Company, St. Louis, Mo. Capital, $100,000. Incorporators. D. C. Sacrse, J. S. Prosser, Virgil M. Harris, Geo. B. Cummings, Frank B. Nall.

W. J. Murray Company, New York City. Contracting, trucking, carting, etc. Capital, $10,000. Incorporators, William J. Murray and William H. Trainer, 607 West 115th street; Henry Smith, 243 West 99th street, all of New York.

San Domingo Construction Company, 317 Market street, Camden, N. J. Real estate, construction of railroads, street pavements, etc. Capital, $125,000. Incorporators: Henry F. Stockwell, Edwin G. C. Bleakly, F. G. Toram, all as above.

Santo Domingo Railroad Company, 317 Market street, Camden, N. J. To construct railroads from San Domingo City, Santo Domingo, to San Cristobal, same island. Capital, $1,000,000. Incorporators: E. A. Blanton, Jr., Philadelphia; Frank Adams, Jr., Charles Bridge, Edwin G. C. Bleakly, all as above.

East McKeesport Incline Railway Company, East McKeesport, Pa. To build an inclined railway from Westinghouse avenue, Wilmerding, to Broadway.

Perry Iron Company, Erie, Pa. To manufacture any article of commerce from metal or wood. Incorporators: T. S. Clark, W. H. Smith, J. R. Hastings, Davenport Gilbraith and Harry L. Moore.

Jackson Railway and Light Company, Jackson, Tenn. To build an urban and suburban railway and supply power. Capital, $600,000. Incorporators: S. S. Bush, William Cox, Alan McDonald, John Wisdom, and C. A. Lehmkuhl.

Fidelity Construction Company, Fort Worth, Tex. Capital stock, $600,000. Purpose to construct railroads and bridges for railroad companies. Incorporators: J. M. C. Usher, D. J. Ehricht and D. T. Bomar, all of Fort Worth.

Hunter-Farry Electric Company, Dallas, Tex. Capital stock, $10,000. Incorporators: J. Peyton Hunter, J. S. Wylie and R. R. Farry.

Ozona Improvement Company, Ozona, Tex. To install an electric light and power plant. Capital, $25,000. Incorporators: John Young, Elam Dudley, and others.

Manhattan Improvement Club, Seattle, Wash. Capital, $100,000. Incorporators: A. A. Jones, J. F. Douglas and N. W. Jordan.

A DIRECTORY OF MUNICIPAL AND ALLIED SOCIETIES

August 1-3.
American Ceramic Society.—Seventh Annual Summer Meeting, Beaver Falls, Pa.—Edward Orton, Jr., Secretary, Columbus, O.

August 1-2.
C. O. S. Y. S. Firemen's Association.—Convention, Canadaigua, N. Y.—F. G. Hulse, Secretary.

August 1-3.
Northwestern Pennsylvania Firemen's Association.—Convention, Southport, Pa.—Fred Seger, Secretary, Emporium, Pa.

August 7-9.
Illinois State Firemen's Association.—Tournament, Urbana.—W. E. Price, Secretary, Champaign, Ill.

August 7-9.
Provincial Volunteer Firemen's Association.—Convention, Hamilton, Ont.—W. J. Armstrong, Secretary, Toronto Junction.

August 8-9.
Northern Central Firemen's Association.—Convention, Pittsford, N. Y.—W. O. Green, Secretary, Fairport.

August 8-9.
Concrete Block Machine Manufacturers' Association.—Annual meeting, Detroit, Mich.—S. L. Wiltse, Secretary, Jackson, Mich.

August 14-16.
The Union of Canadian Municipalities.—Sixth Annual Convention, Halifax, N. S.—W. D. Lighthall, M.A., Secretary, Westmount.

August 14-16.
National Firemen's Association.—Convention, Roanoke, Va.—O. J. McCarthy, Secretary, P. O. Box 600, St. Louis, Mo.

August 14-16.
Nebraska State Firemen's Association.—Convention and tournament, Fremont.—E. A. Miller, Secretary, Kearney.

August 14-17.
Western Pennsylvania Association.—Convention, McDonald, Pa.—W. H. Sharal, Secretary, Braddock.

August 15-16.
Five County Volunteer Association.—Convention, Canton, Pa.—E. J. Cleveland, Secretary.

August 15-17.
International Association of Municipal Electricians.—Annual meeting, New Haven, Conn.—Frank P. Foster, Secretary, Corning, N. Y.

August 16.
New England Veteran Fireman's League.—Hand Engine Muster, Providence, R. I.—W. H. Hathaway, Secretary, Hyde Park Mass.

August 21-22.
Interstate Firemen's Association.—Tournament, Carroll, Ia.—J. H. Post, Secretary, Carroll.

August 21-24.
New York State Firemen's Association.—Convention, parade and tournament, Jamestown, N. Y.—Thomas Honohan, Secretary, Frankfort, N. Y.

August 22-24.
Virginia State Firemen's Association.—Convention, Richmond.—G. C. Cumming, Secretary, Portsmouth, Va.

September 5.
American Society of Civil Engineers.—Next meeting, 220 West 57th street, New York.—Charles Warren Hunt, Secretary.

September 26-28.
League of American Municipalities.—Tenth annual convention, Chicago.—John MacVicar, Secretary, Des Moines, Iowa.

September.
Municipal Civil Service Commissions of all cities in New York State.—Under auspices of State Civil Service Commission, Albany, N. Y.

September.
New England Water Works Association.—Annual convention, White Mountains.—Willard Kent, Secretary, 715 Tremont Temple, Boston, Mass.

October 9.
American Society of Municipal Improvements.—Annual convention, Birmingham, Ala.—George W. Tillson, Secretary, Municipal Building, Brooklyn, N. Y.

October 9-12.
International Association of Fire Engineers.—Annual convention, Dallas, Tex.—Jas. McFall, Secretary, Roanoke, Va.

October 15-19.
American Street and Interurban Railway Association.—Annual convention, Columbus, Ohio.—B. V. Swenson, Secretary, 30 Wall street, New York City.

November 14-16.
International Congress on Tuberculosis.—New York City. (The principal purpose of the congress will be that of urging preventive legislation against tuberculosis, the adoption of municipal and government sanitariums and discussion of all the questions involved.)

PATENT CLAIMS

824,770.—Fire-Hydrant Drain. George J. Williams, Philadelphia, Pa. Serial No. 250,531.
In combination with a hydrant, of a drain receptacle therefor, means for removing the contents from said receptacle, and means for passing steam through said receptacle and thence through said hydrant.

824,804.—Auxiliary Fire-Alarm System. George F. Milliken, Boston, Mass., assignor to Gamewell Fire Alarm Telegraph Company, New York, N. Y. Serial No. 283,590.
The combination with the auxiliary actuating mechanism of a signal box, a circuit therefor, and sub-stations, each sub-station having means for operating said circuit, of an indicating device, a circuit therefor, and means for operating the indicator-circuit controlled by any one of said sub-stations, substantially as described.

825,284.—Beam Clamp and Support for Reinforced Concrete forms. William H. Dillon, Detroit, Mich. Serial No. 245,001.
In building apparatus of the character described, the combination with an upright, of a transverse member supported thereon, and vertical mold-supporting devices upon the transverse member provided with joist-seats.

825,392.—Reinforced Concrete Sectional Conduit. Hugh J. Keenan and Edmund J. Tobin, Jackson, Mich., assignors of one-third to Stephen H. Carroll, Jackson, Mich. Serial No. 302,516.
In a sectional conduit, the combination with abutting sections, of means for locking said sections together, said sections and locking means being constructed and arranged to permit the latter to be operated from the interior of the conduit.

825,564.—Anchored-Block Pavement. Alexander Van Hafften and John L. Gilmore, Minneapolis, Minn. Serial No. 276,969.
The combination with a plurality of paving blocks laid in rows, with the blocks of the rows in close contact, and with the blocks of the several rows in close contact, said blocks having longitudinally-aligned side grooves in the direction of the rows of blocks, of a support for said blocks, of flat anchoring-bars seated entirely within the aligned grooves of adjacent rows of blocks, and bolts seated in said blocks, passed through said anchor-bars and serving to anchor the blocks, substantially as described.

825,623.—Combined Telephone and Alarm System. Harry G. Webster, Chicago, Ill., assignor to Milo G. Kellogg, Chicago, Ill. Serial No. 204,978.
The combination in a telephone-exchange system of a central battery for supplying current to the subscriber's instrument and for signaling, means for interconnecting subscribers' circuits for conversation, a subscriber's instrument, a circuit thereto, means for maintaining a normally continuous flow of current in the circuit of insufficient strength to affect the telephone signaling apparatus, alarm-receiving apparatus associated with the circuit and adapted to be maintained in its normal condition as long as any current is present in the circuit, and alarm-sending apparatus associated with the circuit adapted to deprive said circuit of all current.

825,627.—Reinforced Concrete Construction for Buildings. Charles P. Weeks, San Francisco, Cal. Serial No. 273,367.
Structural building material, consisting of metal pipes having supporting-plates at the lower ends, sleeves at the upper ends adapted to receive other pipes or tubes to form a continuation of the column, said sleeves having supporting-plates and having below said plates lateral branches curved in cross-section and open at the top and forming seats for the ends of girders and beams, and said pipes and branches embedded in concrete.

825,637.—Process of Purifying Water. Charles A. Brown, Lorain, Ohio, assignor to American Steel and Wire Company, a Corporation of New Jersey. Serial No. 276,961.
The herein-described method of purifying water, which consists in treating the water with a coagulant compound in the presence of a relatively smaller amount of a compound which is decomposed to form a germicidal precipitate, and filtering the water through such precipitate.

825,743.—Excavating and Conveying System. Ernest B. Merry, Augusta, Ga. Serial No. 257,608.
In an excavating and conveying system, the combination with tracks, of a frame movable thereon, an excavating apparatus delivering to the frame, and a car movable upon the tracks to a point within the frame.

825,846.—Making Cement Structures Waterproof. Gustav H. Liebau, Metuchen, N. J., assignor of one-fourth to Charles A. Wanner, Melrose Park, Pa., and one-fourth to John A. Stahr, Elkins Park, Pa. Serial No. 293,037.
A compound consisting of concrete, silicate of soda and whale-oil.

Proposals

Department of Public Works,
Bureau of Surveys, Office 416 City Hall,
Philadelphia, Pa., July 26, 1906.

Sealed proposals, endorsed "Bids for Dredging the Channel of the Delaware River," and addressed to the undersigned, at the office above mentioned, will be received until 12 o'clock, noon, on August 15, 1906, for Schedule A, Dredging the Channel of the Delaware River.

Plans for the above work will be exhibited in the office of the Bureau of Surveys, Philadelphia.

Specifications and blank forms upon which bids must be made will be furnished upon application to the Chief Engineer, Room 416, City Hall. Bidders must be skilled and regularly engaged in the class of work bid for. No bid will be considered unless accompanied by a certificate from the City Solicitor that the provisions of an ordinance requiring proposal bonds when the bids exceed in amount five hundred dollars, approved May 25, 1860 (p. 81, West), have been complied with. The Director reserves to himself the right to reject any or all bids, as he may deem best for the interests of the city.

THOMAS L. HICKS,
Director.

Lighting of Streets

Office of the Mayor,
Anniston, Alabama, July 17, 1906.

BIDS WANTED

Sealed proposals, in duplicate, will be received at this office until 12 o'clock, noon, September 20, 1906, for furnishing a minimum of one hundred (100) electric arc lights, to be located under the direction of the Mayor and City Council, on the streets of Anniston, maintaining same and supplying current for the lighting thereof nightly until 10 o'clock p. m., and during all dark hours after said hour, for terms of ten, twenty and thirty years, beginning July 1, 1908. Consumption of electric current at the arc of said lamps must be given, and in all bids must be given a bid for lamps consuming 450 watts at the lamp terminals. The award of this contract will carry with it a franchise for the privilege of supplying electric current for all purposes to corporations and private citizens, and rates at which said current will be sold must be made a part of each proposition. A certified check on a responsible bank for one thousand ($1,000) dollars must accompany each bid as a guarantee that a contract, under $15,000 bond, will be entered into within thirty days after the award thereof, for the purpose of carrying out the terms of the contract. The city reserves the right to reject any and all bids.

THOMAS E. KILBY,
Mayor.

Notice to Contractors

Office of the Mayor,
Anniston, Ala., July 21, 1906.

Sealed proposals will be received by the undersigned until 12 o'clock noon, August 8, 1906, for paving Noble street, from Ninth to Thirteenth streets inclusive, with either vitrified brick or Bitulithic.

A certified check for $500, made payable to the city of Anniston, must accompany each proposal.

The right is reserved to reject any or all proposals. Specifications may be obtained from the undersigned.

THOS. E. KILBY,
Mayor.

Street Lighting

Sealed proposals will be received by the Town Council of Pottsville, Pa., until 7.30 p.m., on Tuesday, Sept. 18, 1906, for lighting the streets of the borough and borough buildings with either electricity or gas for a period of five years from February 15, 1907.

"Bids for electric lighting to be for 137 or more arc lights and 50 or more incandescent lights for streets, with extra bids for buildings.

"Successful bidder to furnish approved bond in the sum of ten thousand dollars, conditioned for faithful performance of contract.

"A certified check for $2,500 to accompany each bid, which shall be forfeited on failure to execute said bond and contract. Candle power and character of lamp to be designated in bid. Council reserves the right to reject any or all bids or parts of bids."

By order of Town Council.

Attest:—G. A. BERNER, Town Clerk.
Pottsville, June 19, 1906.

Paving

Sealed bids will be received at the City Clerk's office, Flint, Mich., until August 13, 1906, at 3 o'clock P. M., for furnishing all material and performing all labor necessary in the construction of approximately 10,000 linear ft. of combination cement, curb, and gutter and 16,350 sq. yds. of brick pavement complete, in accordance with plans and specifications on file in the City Clerk's office. The job will be let in four sections, and a certified check of $500 will be required for each section bid on. The Council reserves the right to reject any or all bids.

D. E. NEWCOMBE,
City Clerk.

Destructors for Edmonton

City of Edmonton, Alta. Tenders for Refuse Destructors.

Tenders are invited for destructors for the city sanitary department.

Present population approximately 12,000. Propositions and plans to be fully descriptive of capacity, etc., with arrangements for readily extending the plant.

Tenders and plans addressed "City Commissioners. Edmonton." to be delivered not later than Monday, 6th August, 1906.

GEORGE J. KINNAIRD,
Secretary-Treasurer.
Edmonton, June 25, 1906.

Poles and Wires

Coal Dale, Pa., Borough intends to wire and pole the Borough for street and house light. Would like to meet a party who could give an estimate of the cost of this work.

CON F. BONER, Secy.

What Is Daus' Tip-Top?

To Prove that Daus' "Tip-Top" is the best and simplest device for making **100 Copies** from pen-written and **50 Copies** from type-written original, we will ship complete duplicator, cap size, **without deposit** on **ten (10) days' trial.** Price, $7.50, less trade discount, 33⅓ per cent., or **$5** Net.

THE FELIX H. A. DAUS DUPLICATOR CO.

Daus Building. **111 John St., New York City**

Back Numbers Wanted

We are short of copies of February 21st and April 25th, 1906, of this paper. If you have them and do not want to keep them you will oblige us greatly by mailing them to the New York office,

Flatiron Building,
Madison Square.

All previous lists and discounts withdrawn
Several tons of our new Hydraulic Handbooks are now ready and copies will be sent postpaid to anyone interested in MODERN PIPING, BOILERS and HYDRAULIC MINING SUPPLIES.
ABENDROTH & ROOT MFG. CO.
MAIN OFFICE & FACTORY
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NEW YORK PITTSBURG
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Root Spiral Riveted Pipe.
Root Water Tube Boilers.